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ProKey 4.0 keyword macros unsnarl

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IDEA CREDIT: Ann Garner Riddle of Winston-Salem, N.C.

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ITTxtra XP Frank J. Derfler, Jr./Appearances can be deceiving. Smaller and less costly than the AT, the ITTxtra XP offers full PC compatibility and plenty of power.

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Turning Data into Information Charles Petzold/STATA and Statgraphics are two statistical graphics programs that can translate those confusing numbers into meaningful graphs.

Multiple Approaches to Multiuser Database Management.... John R. Phillips/TEAM-UP.

PICK, and Network Revelation are three powerful multiuser database managers that bring the advantages of multiuser systems to the PC marketplace.



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bers into spreadsheet		52	
Adjustable margins	YES		
Scheduler message size	UNLIMITED	36 char	35char
Alerts you to appointments	YES	No	Yes
Stop watch/clapsed time feature	YES	No	No
Start programs as specific time		- 49	- 40

Display time constant) Dage starme documents No Calculator has on-screen loar financial calculations cinterest annuaties esch sscal analysis mode (standard deviation, etc.) No DOS-command No

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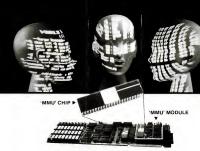


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PC Magazine—May 14, 1985

Several industry leaders have echoed... concern that (Bank-Switching) is only a stop gap measure on the way to full use of... on chip memory management (MMU). PC Magazine shares that concern."

PC Week-April 16, 1985

ff MMU, a function that controls how memory is addressed, is more sophisticated than Bank-Switching techniques"

PC Magazine-June 11, 1985

Spring COMDEX..... The introduction of a memory expansion card (NLCARD) with full memory management facilities for 4 megabytes of on-board PC RAM was one of the more exciting of these developments.

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Personal Computing-August, 1985

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What's Inside

The PC AT is an awe-inspiring machine, but the marketplace is big enough to offer some stiff competition to IBM's monster.

In this issue, we survey AT alternatives.

f you want to increase your computing speed and power, the obvious solution is to buy an AT. But we at PC Magazine felt sure that the huge PC marketplace must offer some other options.

Bill Machine ("High-Performance Alternatives to the PC AT," page 100 starts off on the right foot by explaining what makes the AT desirable. But this is far from a one-computer race. Close at Machrone's heels are several of our most trusted reviewers, who discuss new computers and enhancements that can match the AT's speech.

Alfred Poor's review of the COMPAQ Portable 286 shows that it not only be the AT in several speed tests, but it retains COMPAQ's famous portability. Fank J. Derfler, Jr., suprised us with his excited ment over the ITTAT xP. These and five other computers reviewed in this issue, the COMPAQ Deskyor 286, the Kaypro 286, the AT&T PC 4300, and the Gulfstream PC 286 and PC/88, are running a good race, gaining on and even outstripping the AT computing standard.

If you're too attached to your PC to consider abundoning it in favor of a hyper-performance replacement, here's good news: You don't have to settle for slow-poke computing. In "Pushing Your PC Past the Speed Limit" (page 130), Winn Rosch evaluates six turbo boards and finds speedy results.

Benched

One of our obligations to you is to create reliable, repeatable benchmark tests. Over the past several years, we have designed, programmed, improved, and con-



solidated our benchmarks into the PC Magazine Labs Benchmark Series. These tests assess the speed and specific capabilities of the products we review and compare the results with an accepted standard to help you make an educated decision about your product purchases.

In compiling the benchmark results for the AT alternatives, we noted a scenning inconsistency in the first benchmark results. Our product resting editor, Mike O'Come, took a deep breath and said, "You think it should take less time to write and read a file with 128-byte records in it than it takes to write and read a larger record, like 200-byte, si that your problem?" Well, that was exactly our problem. O'Cone got to the heart of the matter with

the following analogy.

"Let's say that you have three containers: a bucket, a basin, and a cup. You are told to fill the bucket with water. First

time, you have to use the cup to transfer the water to the backer. The second time, you the third water to the backer. The second time, you do not not seen to be seen to be seen to be seen to see the seen to should take less time. From the computer's point of view, writing a 300-byte file to disk is exactly the same—a larger unit is more efficient. Now, just to make things interesting, you also have to empty the backer, once with a cup and once with a basin. The basin can hold more water, but it difficult to manever in and out of the backer. A larger unit, be if bucker of 300 to backer. A larger unit, be if bucker of 300 efficient than the smaller unit.

Although enlightened by O'Cone's analogy, we included only the larger record sizes results. You'll see these and other benchmark tests in future issues.

The People's Choice

M. David Stone, our communications expert, evaluates two buffers that support modems and printers ("Buffers That Boots Communications Potential," page Boots Communications Potential," page to the property of the property o

Each of these reviews compares several products in a given category, and each explains how the programs suit different needs—leaving the final choice exactly where it belongs—with you.



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preter so many have at some point used 500 plus page manual brauming over with C language examples.
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#### cluster of functions until indestructible and ready for the Gress American Program. Bigger Bua

RUN/C Professional adds a new level of built in debogging axis to RUN/Cs TRON and TRACE. They are ingeniously tustalled behind one of RUN/C Pros built-in

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current function - even if more than one function used the same variable name he Pro version also enables #define's with macros, and supports standard inputoutput functions (sidin striput stderr).

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it's like using IBM® BASIC, with familier ommands like LOAD MERGE, SAVE and FILES it has a full-screen editor which allows you to insert, edit, list or delete lines on the spot. When ready to test, just say

RUN Your program executes instantly If an error halts it. RUN/C explains why and where. You just EDIT the offending lines of

code and RUN again If you are already a C user, ultimately you'll want to hand your work to a compiler, for linking and for speed of execution. But you undoubtedly sense the tremendors time savings of getting cut of

compiler loop at or near the beginning of program development RUN/C lets you develop and test code rapidly, without fussy checking. No more making things extra tidy to get-ready-for the-compiler, where a forgotten semicol draws 15 menutes in the penalty box. With RUN/C you can try out things deval-may care. Let it find your types and malapro it's nothing to change them and re-RUN

#### How it works.

RUN/C handles the differences between the compiler and interpretet environments with creat common sense. As an interpreter, if expects nothing but source. but Anciades can pull in 'define' and other source code files - functions you have already written, for example, or functions from commercial libraries which provide source code, like Greenleaf and BASIC_C The #arcluded files stay hidden. They don't blost your listings. And they don't SAVE with the main() you're working on (for which MERGE is available). to show what's going on behind the scen as a program executes. Switch on TRON which displays on screen each line of source code as a executes (unermander with what the program puts to the screen)

It shows just where you were in the program when it departed for the back of beyond. Or try TRACE, which shows the current values of all variables referred to in a source line each time it is encournered Or turn on PRON and then iss a program after a run each line appears with a number as in <12>printf ("romething").

which says that the line was executed 12 times, a word picture of where to optimize

No end of features. RUN/C has a SHELL command who will awoke any operating system command, with both RUN/C and your program still in memory. No need to exit and reload everything And finally, the EDITOR command When RUN/C arrives, tell at the name of your favorate educar's COM or EXE file.

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Structures, unions, initializers and ridefines with arguments are supported, as well as keyboard and screen redirecfron from and to Nes. No extern defini-tions, and RUNC Lite requires that all functions must be fincluded or MERGEd. TYPEDEF, REGISTER and function pointers are not supported as of this writ-ing. RUNIC automatically senses and uses the 8067 and 80267 math chips.

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store addresses of other variables of the same type assigned to them, such as

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If you know C, you never thought BASIC

different types into a record which is given a name. Arrays of such structures may be defined to accommodate data for multiple records. The structure name is all that is

needed for file roads and writes, leading to the unmourned decise of FIELD MKIS, etc., CVD, etc., LSET, RSET, Are you listening Microsoft users? They, and the

Babel of redundant variables they needed

BetterBASIC has "procedures" They take the place of BASIC subcounces. Set

up in their own work space and edited

ey are summoned by name, not (as in

riess deliberately passed back and forth Best of all once you have sturdy pro-

cedures which can be relied on never to

spile language to which you can add your

bout a runtime module to build COM and EXE files, and a Btneve interface.

own communics
There's lots more than fits here. A

fail, store them in compiled modules. Have BetterBASIC fold in such modules at load time, so they are generally available your coding, just like PRINT or INPUT So what have we here? That's right, an exten-

COSUBs) by line number, and variables

declared within them cannot be affected by the main orotram or other procedur

BeterBASIC has

are. A structure cathers variables of

pointers of C. Variables defined as pointers

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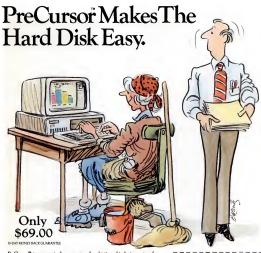
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- PC Magazine, September 4, 1984

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	Revelation	R:base 5000	dBASE III				
Maximum Characters/Record	65000	1530	4000				
Maximum Fields/Record	65000	400	128				
Relational Operators	9	6	6				
Data Dictionary	Yes	Yes	No				
Procedural Language	Yes	Yes	Yes				
Variable-Length Fields	Yes	No	No				
Report Writing Features:							
A) Access to Date/Time	Yes	Yes	No				
B) Row or Column Formats	Yes	Yes	No				
C) Accessible Tables	6000	40	10				
Password Security	Yes	Yes	No				
Definable Data Entry Rules	Yes	Yes	No				
Pre-Defined Macros	Yes	Yes	Yes				
Application Generator	Yes	Yes	No				
Application Compiler (1)	Yes	Yes	No				
Run-Time Module	Yes	Yes ⁽²⁾	Yes(2)				
Natural Language	Yes	Yes ⁽³⁾	No				
Network Version	Yes	No ⁽⁴⁾	No				

1) From original manufacturer, 2) Available soon; 3) Extra cost option, 4) Announced for late 1985, dBASE III is a

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Of course, our first reaction was smiles all around (and a celebration or two). Our second reaction? Back to work on WordPerfect. Not because it in't already a great program. But because the one thing that has made WordPerfect a success is our commitment to constant improvement. Reaching for perfection.

The latest result of that commitment is WordPerfect 4.1. And with several new features, it scores more than a few extra points.

#### 1. Thesaurus

With a built-in thesaurus, WordPerfect 4.1 lets you choose synonyms for any words in your document.

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#### 5. Sart

WordPerfect 4.1 allows you to sort lines, paragraphs or merge files alphabetically.

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# *Just Write, Ea* **Challenge PF**

### BY CHARLES BERMANT

NEW YORK-PFS:WRITE's stranglehold on the lower-end. simple-to-use segment of the word processing market stands challenged by two of the industry's heaviest hitters, MicroPro and Multimate, who previously concentrated on full-featured. higher-priced word processors.

MicroPro International Corp.'s Easy and Multimate International's Just Write, both new products, are poised to snare the market virtually owned by Software Publishing's PFS:WRITE, which is also known as the IRM Writing Assistant. Software Publishing, in turn, recently released an enhanced version of PFS:. All three of these programs list for about \$150, and may be available for as little as \$100. Dozens of word processing programs compete in the low

end of the market, ranging from

\$10 to \$200. Of these, only PFS:WRITE is regularly in the list of top-selling software. The other best sellers are all more complicated: Multimate. Microsoft Word, Satellite Software's Word Perfect, and

MicroPro's WordStar

MicroPro says outright that Easy is targeted at PFS:WRITE. "The competitor is the one who holds the top of the hill," says company spokesperson Wink Grelis. "We are out to beat the leader." Grelis does not feel threatened by Multimate's Just Write, which was released with a \$245 price tag that was cut to \$145 immediately after Easy

was released. (See reviews of Easy and Just Write, page 35.) Multimate initially said the \$100 Just Write reduction was based on customer feedback rather than pressure from Easy, however, Bob Obuch, Multimate vice president for sales and marketing, later agreed the

#### PFS:WRITE Versus the Challengers

	Easy	Jest Write	Old PFS:	New Pi
Price	\$150	\$145	\$140	\$140
Undo key	Yes	Yes	No	No
Use files from any sobdirectory	Yes	No	No	Yes
Autematic BAK file	Yes	No	No	No
Mailmerge	No*	No	Yes*	Yes*
Maximum file size	Unlimited*	Unlimited*	64K	64K
Maximem celemes	240	131	78	250
Copy protected?	No	No	Yes	Yes*
Spelling checker	Yes	Yes	\$95	Yes

* Notes: PFS:WRITE requires PFS:FILE (\$140) to do mailing-list mergers. Easy promises a mailing list function by year end. Easy and Just Write files are limited only by disk space. PFS:WRITE allows one backup copy and ten hard disk installations. Chart Compiled by Christopher Johnston

change reflected "increased | price sensitivity from our competitor, we had to respond." Just Write, Multimate says, is not aimed directly against

PFS:WRITE. "Our overall strategy was to market a full line of packages," says Obuch. "We did not target specific (continued on ucut vare)

### Lotus Sends Strong Signal To the Investor's Market

BY VIRGINIA DUDEK NEW YORK-Lotus Develop-

ment Corporation has gone bullish on the information-services industry with the announcement of Signal, a hardware/software system that allows users to receive real-time stock-market quotations through a low-cost FM sideband transmission. Lothat Signal users can access one of seven stock, commodities. and financial instrument exchanges offered for an additional monthly fee

With Signal, stock-market data can be loaded onto Lotus's 1-2-3, Symphony, or any other database or spreadsheet software for analysis. Instant track-

quotations can be performed by transforming the broadcast data into a spreadsheet or graph

Signal gives users access to over 20,000 stock-market listines. Targeted for small-to-medium-sized investment and trading professionals, potential customers include portfolio and pension- fund managers as well as future applications in the insurance and accounting industries.

Signal can also be configured to send out a visual and audio alert if a particular stock goes beyond a value designated by the user. A beep sounds that alerts users to a sharp rise or fall in a stock quote, even if the PC is turned off.

#### Hot Options

Signal is available only in 12 cities marked as high-use areas where Lotus has installed the (continued on next page)

products. I still think Just Write is underpriced for its quality."

#### The Osborne Influence

No one will admit to being influenced by Adam Osborne's Paperback Software company, which has sold inexpensive packages since early this year. including Paperback Writer and Executive Writer for \$39.95 and \$69.95, respectively. Osborne has forecast a decrease in soft-

#### MicroPro savs outright that Easy is targeted at PFS-WRITE

ware prices, although he predicted a more drastic drop than what is reflected by the Just Write/Fasy pricing

"It's somewhat of a vindication of our position," says Paperback Software spokesman Mike Burdick, "These packages still cost two or three times more than ours do. But it does acknowledge that prices are too high.

'Lower-priced packages are not the kind of things that are sold in ComputerLand," says Cathy Scott, product marketing manager for Thorn/EM1, manufacturers of the \$199 Perfect Writer. "Sales come more from direct sales, telemarketing, or buying off the shelf. It's not a corporate sale, it's more of a product for the home or small

business." Scott says the company has no plans to realign its pricing or marketing strategies to compete with Just Write and Easy.

#### Weaklings

"Just Write doesn't have marketing punch," says John Williams of Software Specialists in Washington, D.C. "These big guys should create immediate demand; the fact that they have a product out should bring people in the door."

Williams does not agree with the view of some dealers that less expensive programs are not worth suggesting because of a

PFS:WRITE Challenges narrower profit margin.

"The fall in prices is inevitable," he says. "It is going to put

mail order and sehlock out of business and make the software industry into a service indus-

try." Satellite Software of Orem. Utah, manufacturers of Word Perfect, has marketed Personal Word Perfect and Word Perfect Junior (which Williams says he recommends to customers) at \$195 and \$89, respectively, for more than 2 years. Company vice president Pete Peterson says that the low-end market is less than lucrative. The monthly take for the less expensive products is \$10,000 cach, compared to \$1.8 million for the full-

strength package "The market just doesn't seem to be there," he says. "Maybe we haven't been able to sell it successfully."

#### Price Pressure

Peterson says that price pressures on distributors, along with the fact that mail-order prices are getting close to those on the low end, contributed to the new interest in the market

"It is our impression that most people would rather buy the best even if they don't use all of the features," says Peterson. "We think it's fun that Multimate and MicroPro are doing this. It's wonderful that they'll spend the money and resources-it takes away from their other developments."

MicroPro, in fact, is taking nothing for granted and is not riding on reputation for Easy's promotion. They have sent merchandising kits to 4,000 dealers and are setting up promotional "road shows" in 21 cities.

MicroPro president H. Glen Haney calls Easy "clearly the easiest-to-use word processor on the market." Easy, says Grelis, completes the long-term MicroPro strategy of three products for three different requirements. She denies that Easy is a "last-gasp" product for MieroPro that is meant to rejuvenate the company after negative reaction to WordStar 2000. In fact, the spokesperson points out that WordStar 2000 now has 15 percent of the Fortune 1000 market.

#### Lotus Sends Signal

(continued from preceding page) necessary transmitting equipment. Those cities include Atlanta, Baltimore, Boston, Chicago, Dallas, Ft. Worth, Houston, Los Angeles, Miami/ Ft. Lauderdale, New York, Philadelphia, San Francisco, and Washington, D.C. However. Lotus officials noted that users within a 50-mile radius of those cities would be able to access Signal.

#### High-Tech Buy Out Lotus acquired the FM-trans-

mission technology from Dataspeed Inc. of San Mateo, California, in July of 1985. Dataspeed has since been renamed the Lotus Information Network Corporation (LINC), a wholly owned subsidiary of Lo-

Signal comes with an FM receiver, software, antenna, documentation, and portfolio-valuation templates for 1-2-3 and

Symphony. The entire system retails for \$595 and was scheduled to be available October 1. In addition, users can sub-

scribe to one or all of seven available exchange-and-commodities services offered by Lotus for a monthly fee. Lotus charges a basic subscription fee of \$80 per month and \$20 per month for each individual exchange accessed.

The seven exchanges on which information is available are the New York and American Stock Exchanges, NASDAQ-NMS/NASDAO-Level I, Chicago Board of Trade, Chicago Mercantile Exchange, Com-

#### Unfinished Symphony In a separate development, Lo-

tus has detected a bug in the newest version of Symphony. A data-storage problem was discovered in Symphony, Version 1.1, in late August by Loius and many users of the newer version. Version 1.1 has been available since July of 1985. Lotus says the program has a bug that appears when users implemented some of the following functions: inserting data into rows or columns of the spreadsheet, deleting data, or moving numbers between different sections of the program. Lotus intended to ship free replacements disks to Version 1.1

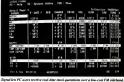
In a related matter Lotus also announced that users who purchased their 1-2-3 on or after April 24, 1985, will receive Version 2.0 free of charge. Upgrade kits were to have been sent to all registered users. Users who did not receive kits or need more information should call the toll-free number, (800) TRADEUP. Upgrades cost \$150, and volume discounts are available for orders of 100 or -Virvinia Dudek

owners by early October

modities Exchange Center Inc.. and the Options Price Reporting

Authority. Signal runs on the IBM PC. XT, AT, or PC Portable and requires 320K and a 9600-baud serial interface card. Lotus was expected to make an October

announcment to verify which PC-compatible computers Signal will run on.



Data can be loaded directly into 1-2-3. Symph. ny, or other spreadsheet programs.

#### FIRST LOOK: PFS:WRITE COMPETITORS

#### MicroPro's Easy: Built For Comfort, Not Speed

BY BILL HOWARD

It wasn't long ago that MicroPro sold WordStar for \$495 and a companion spelling checker for \$195. You can buy a complete MicroPro word processor and spelling checker for \$150 today.

How does the company do it? It's Easy, says MicroPro. Easy is a good name for a package taking dead aim at PFS:WRITE in the "ez-2-use" low end of the word processing market.

Whether Easy-or Multimate's Just Write-can knock off PFS:WRITE as king of the low-end hill is yet to be seen. Easy offers considerably more features than the old PFS:WRITE, but Software Publishing just ungraded the old package, which continues to feature a superb sereen display.

#### Easy Does It

What, then, does Easy have on its side? Its files are 100 percent compatible with WordStar and editing and help screens are pop-up boxes like those of Side-Kick. Only two function keys work. F1 for help and F2 for the editing menu. Easy accurately displays page breaks for single, double, or triple spacing: PFS:WRITE was graceful only with single spacing.

Easy's help sereens and suggested editing choices are sensitive to what the user is doing. Example: After going to the editing menu to change line spacing, the next time you return, Easy highlights the paragraph-reformatting option. which is probably what you

Unlike those in WordStar. Easy's underlining and boldface show up on sereen. There's an "undo" key. Paragraph reformatting is generally, but not always, automatic (it can be fooled). The first-rate spelling checker makes excellent use of the pop-up windows, and the suspicious word blinks in reverse video. The printer-configuration chart includes just about every machine made since World War II.

#### Over Easy

Drawbacks? Quick and easy it isn't. (It's written in Modula.) Typing in the middle of a document with the insert ontion on is like running through waist-deep oatmeal, and PC Magazine's Page Layest

Context-sensitive help and option menus give Easy one advantage over PFS:WRITE. Above, about the best explanation of page formatting seen on a word processor,

first-look review was on a not really. Nor is it clearly Compaq Deskpro 286 running worse, Easy deserves a solid

at a hyperthyroid 8 megahertz. The search and replace function could be faster. Help screens and editing menus are called from disk, so impatient "type A" people should run Easy only from a hard disk. There's no jump or delete-by-word function. Breaking the 19 editing choices accessed by F2 into windows of 10 and 9 choices is less imposing than one window of 19 and allows for mnemonice commands, but it's a pain flip-

ping between the two windows. Is Easy clearly better than PFS:WRITE? At first glance, dure" function; or merging text

place in the low-end spectrum, most logically in a WordStardominated office setting where files get swapped and easual users have balked at WordStar's stiff learning curve.

MicroPro International Com 33 San Pablo Ave.

San Rafael, CA 94903 (415) 499-1240 List Price: \$150 Requires: 256K RAM, DOS 2.0 or later

additional support. Buyers must

#### Just Write: About Right For the Lower End

BY C.J. PUOTINEN

With its slick packaging, wellorganized documentation, and \$145 price tag, Multimate International's new Just Write program looks like a serious lowend word processor. Its name is its philosophy: Just write and don't worry about cumbersome

That approach works well if your projects are simple. Just Write is not promoted as an office word processor, and for good reason. Unlike Multi-Mate, Version 3.3, which it closely resembles, the program does not have commands for headers, footers, subscripts, superscripts, half-line spacing, or the top-margin setting; positioning and locating temporary place markers; selecting proportional spacing or microjustification; entering several print commands in a "queue" for unsupervised printing; delaying printing; entering columns of numbers with decimal tabs; adding or subtracting columns of numbers; printing and editing simultaneously; inserting new text in a convenient split-screen opening: repaginating automatically: eliminating widows and

orphans; saving keystrokes with

a built-in macro or "key proce-

3.3, provides a Who's Who of printer and sheet-feeder technology, Just Write supports only Epson, IBM Graphics, Okidata 93, and Diablo 630 printers in addition to the default TTY and TTYCRLF What does Just Write do? In

to ereate custom form letters.

While MultiMate, Version

addition to basic editing features, the program offers commands for inserting text from other files and storing phrases for use in boilerplate documents. Its semiautomatic footnoting feature numbers and positions footnotes, though the program's user must set page breaks by hand.

New users can make two tollfree calls to the support line and pay \$25 for a year of unlimited register by mail in order to reegive the free spelling ebecker and a second optional disk that converts MultiMate files to Just Write and vice versa.

Just Write is designed for the word processing novice, and it seems best suited to nontechnical report and personal writing rather than business correspondence. The program is not copy

protected.

Just Write Multimate International 52 Oakland Ave. North East Hartford, CT 06108

(203) 522-2116 (800) 842-8676 List Price: \$145 Requires: 128K-bytes RAM; DOS 2.0 or later.

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#### NEWS IN BRIEF BY JANE MINTZER

New AT Compatible. . . STM Electronics Corporation has added a new IBM compatible to its line of personal computers-this time it's an AT clone

For \$3,495, the basic version of the STM AT has 640K bytes of RAM, a 1.2-megabyte floppy drive, and a monochrome graphics eard, but no monitor. The enhanced STM AT, for \$4,995 has a 20megabyte hard disk. (In com-

parison, IBM's enhanced AT is priced at \$5,795, and its basic version is listed at \$3,995, both without monitor.)

The AT-compatible system switches between a 6- or 8megahertz clock rate and runs under DOS 3.1, 3.0, and XENIX. The drive-controller card runs two floppy and hard disk drives. The STM AT will accept AT expansion options, and has eight expansion slots. STM Electronics is at 535 Middlefield Rd., Menlo Park, CA

94025, (415) 326-6226.

DOS 2 0 or later



1.2 megabyte floppy drive for \$3,495. With a 20-megabete hard disk added, its cost is \$4,995.

Word Perfect Adds 25 Features . . . While the competition fights it out for the low-end word processing market, Satellite Software has refined its Word Perfect package for those who crave a full-featured, full-priced PC word processor.

Word Perfect, Version 4.1, has about 25 added features and capabilities, while keeping its \$495 price tag. The new package includes both a 150,000-word thesaurus and an error checker, along with a three-level undelete function and line-drawing capabilities.

The program also includes a word-search feature that can find specific character strings. An entire disk can be searched in seconds, with all files containing the string displayed on-screen Updates for Word Perfect users are \$45. It requires 256K and

A Satellite Software representative called the updated program "a major enhancement" rather than a new product. He added that the company once considered including a communications program in the package. "I'm not sure what else you could pack on," he said. "With any more than what we have here, you wouldn't be able to run it on a floppy-based system." -Charles Bermant

Adding to Symphony . . . LeBlond Software Inc. has developed a new software package, Basie Concerto, that enables software developers to design Symphony add-in templates using BASIC instead of the previously required assembly language. This is Lotus Development Corporation's first collaboration with a third-party developer for a Symphony productivity tool. Lotus believes that the introduction of Basic Concerto will encourage corporate and individual developers to design Symphony add-in capabilities to tailor the program to their individual needs Geoffrey T. LeBlond, president of LeBlond Software and co-

author of Using Symphony and Using 1-2-3 (both from Oue Corp.), says he has plans to develop Basic Concerto in other program languages, including Pascal Concerto (which will run with Turbo Paseal) in December, with a C version soon to follow.

Basic Concerto costs \$99. For information: LeBlond Software, 2421 Willowbrook Pkwy., Suite 507, Indianapolis, IN 46205, (800) 222-4711.

Actionwriter Linked to PCs . . . IBM has released an adapter panel that turns a typewriter into a printer, as well as three new telecommunications devices.

The \$260 Printer Option allows the Actionwriter I typewriter to be used as a letter-quality PC printer without taking away the functionality of the typewriter.

The Printer Option consists of a backpack punel that connects the typewriter to the PC via a parallel cable. In printer mode, the Actionwriter I prints up to 13 characters-per-second. Although a special print wheel is not required for the typewriter when using the

Printer Option, an IBM Compact Printwheel is available for \$20. IBM's three new telecommunications products include the IBM 3708 network conversion unit. It enables asynchronous ASCII terminals and workstations, such as IBM PCs, to communicate with host computers using IBM's Systems Network Architecture protoeol. Retail price is \$4,500.

The communications adapter sells for \$3,300. It allows users of the IBM 3710 network controller to achieve the same protocol conversion function as the 3708.

The IBM 3299 model 2 terminal multiplexer allows IBM 3270 series terminals to be connected directly to IBM 3274 control units at distances of up to 6,000 feet using the IBM Cabling System. This speed is about 50 percent farther than with the model 1, according to IBM. The model 2 can also be used with coaxial cable, and retails for \$1,175.

**Brief Briefs** . . . Priam Corporation welcomes two new add-in disk drives to its family of InnerSpace Winchester drives and has dropped the prices for its PC-XT and PC AT drives. The two new high-capacity drives are for PCs and XTs that don't have disk controllers. The 43-megabyte ID40-PC costs \$1,998 and the 60megabyte ID60-PC costs \$2,298. The XT and AT drive prices have been reduced 15 percent to \$1,698 for the 43-megabyte capacity drive and 20 percent for the 60-megabyte capacity drive, which now costs \$1,998. Priam is located at 20 W. Montague Expwy., San Jose, CA 95134-2085, (408) 946-5679 . . . Software producers are invited to join the National Bureau of Standards' (NBS) Institute for Computer Sciences and Technology (ICST) in designing, developing, and evaluating software test methods. These test methods will be used to determine what software complies with the emerging national and international standards. To participate, contact The National Bureau of Standards, A255 Technology Building. Gaithersburg, MD 20899, (301) 921-3553 . . . Compuware Corporation has acquired PowerBase Systems Inc. the developer of





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Software packages hit the marketplace daily common companies with track records shorter than a safari. Miracle promises. Miracle prices. You II quickly discover why you got the software at a miracle price when you call the company you bought it from and try to work out your problems with an answering machine.

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# FASTLINK Modems Hit 10,000 bps

BY M. DAVID STONE
You can think about IRMA's
FASTLINK modem from Digital Communications Associates
Inc. (DCA) in at least two ways.
On the one hand, it's a perfectly ordinary. Hayes-computible, autodial, auto-answer
modem operating at 300 and
1,200 bits per second.

On the other hand, FASTLINK is an anything-butordinary modern whose top 10.000-bps speed obscures every other feature.

#### Fast Talking

For anyone familiar with communications, the 10,000-bps figure probably looks strange. Standard communications speeds include 300, 600, 1,200, 2,400, 4,800, 9,600, and 192,00 bits per second. The 10,000-bps figure doesn't show



FASTLINK delivers 300 1200 few compatibility and 10.000 bps error-free transfer when conserved to another Fastlink. up at all. What's more, IBM says the PC's asyne card goes

up to only 9,600 bps.

All true. But so is DCA's claim that the modem does 10,000 bps. The trick is accom-

plished with a significantly different approach to communications. Most moderns talk to a computer at the same speed they talk to the modem on the other end of the line. FASTLINK has the same requirement at 300 bps and 1,200 bps. In fast mode. FASTLINK talks to the computer at one speed while it talks to the other modem (another FASTLINK) at some other

More important the FASTLINK modems constantly monitor the quality of the phone line and adjust the communications speed accordingly. DCA says FASTLINK can adjust the speed every few milliseconds. If line conditions are poor or deteriorating. FASTLINK drops its speed in increments of less than 100 bps until it finds the maximum speed for accurate transmission,

Speed Scheming
The idea is to set FASTLINK
to talk to your computer at the
fastest possible speed, then let
FASTLINK find the fastest
speed the phone line can handle.
Ideally, the computer-tomodern speed should be higher
than the modern-to-modern
speed, FASTLINK can then
control the flow of information

by sending signals to the computer to tell it when to start and stop sending data. Under optimum conditions. FASTLINK modems will com-

#### New Crosstalk

ROSWELL. Ga.—"We made our bed, and now we're lying in it." Murrostuf spokesman Stan Hays says of the delay in releasing his company's widely heralded CROSSTALR Mark IV telecommunications program. "Implementing the system

"Implementing the system architecture we wanted wasn't as straightforward as we thought," Hays explained. Delivery originally was to have been in August. No new shipment date has been set.

ment date has been sup-CROSSTALK Mark IV is supposed to support up to 15 concurrent vessions. Cost for the package is \$245 or \$50 as an upgrade from CROSSTALK XIV. In fact, Microstuf recently released Version 3.6 of the \$195 CROSSTALK XIV package, adding on the Kermit communications protocol.

-Christopher Johnston

municate with each other at 14,000 to 15,000 bps. A built in rore-correction feature slows the effective flow of information down to about 10,000 bps. Of course, for this scheme to work, the PC still has to run at well over 9,600 bps. According to Digital Communications Associates, it does no readily.

#### Lab Looks

PC Magazine's tests were less extensive—a first look over a few days—but I have to agree that the modem seems to work swimmingly with the PC set at

19.200 bps.

As expected from FASTLINK's variable speed, timed trials for a 100K file transfer gave different answers as the quality of the phone line changed. But the modems consistently performed at well over 9,000 bps. The best speed 1 timed was 10.396 bps—100K

file in well under 2 minutes.

The FASTLINK comes in two versions. The internal version, at \$1,995, is a board modern that will fit in any full-size slot in a PC, XT, or AT.

The external version, as \$2,395, is an RS-232 device that connects to a PC's serial port. The internal FASTLINK comes bundled with CROSSTALK. FAST. a slightly modified version of CROSSTALK XVI. The external version comes without software, but CROSSTALK. FAST is available for \$195 cx VIII. CROSSTALK XVIII. CAUSTLING CROSSTALK CRO

owners can upgrade for \$50.

FASTLINK is not a modem for the easual communications user. But if you spend much time or money transferring files between locations, it's well worth the user's while to consider an investment in two FASTLINK modems.

IRMA's FASTLINK Digital Communications Associates Inc. 100 Alderman Dr.

Alpharetta, GA 30201 (404) 442-4000 List Price: Internal version with CROSSTALK-FAST, \$1,995; external, \$2,395; CROSSTALK-FAST, \$195

#### Ven-Tel 2400 Twice the Speed in Half the Space

BY M. DAVID STONE
To the growing list of 2,400-bit-per-second modems for the PC,
XT, AT, and compatibles, add
the Ven-Tel Half Card 24. Ven-

Tel Inc. is known for its Half Card 1200 baud modem, a Hayes-compatible, IBM PC-XT short slot 300/1,200-bps

As the name implies, the new Hall Card 24 modem can also fit in an XT's short slot. Other than that, it sports fairly standard features for a 2.460-bps internal modem. including the ability to talk to other modems at 300 and 1.200 bps as well as 2.400 bps. As with most internal modemned with the control of the standard standard with software. CROSSTAIA, XIV. It's worth noting that Ven-Tel has wisely stayed with the Hayes Smartmodem 1200 commund set. making the modem and set.

compatible with other software.

At \$695, the Half Card 24 is one

of the less expensive 2,400-bps modems available, and it is well worth a look.

An external version is available at \$695 without software.



Ven-Tel v 300 1,2002,400-bps Half Card 24 mod

Ven-Tel Half Card 24 Ven-Tel 2400 Plus Ven-Tel Inc. 2342 Walsh Ave.. Santa Clara, CA 95051 (408) 727-5727 List Price: Internal ver-

sion with CROSSTALK XVI, \$695; external version without software. \$695.



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OUR REFERENCES:

#### Access, Relay Gold Offer Sophisticated Features

BY M. DAVID STONE

At least two communications programs released recently are worth special comment: Microsoft Access and Relay

Microsoft is a world-class player in the software market, a fact that alone carns Access some attention. But the program deserves that attention on its own merits. By any measure. the \$250 Access is a full-function communications program, filled with such features as autodial, a built-in editor, and error-correcting file transfers. It goes a step further than most current full-function programs, offering a highly sophisticated script language, and the ability to carry on up to eight simultaneous communications sessions

VM Personal Computing is offering Relay Gold as a kind of big brother to its Relay communications program. Relay (\$225) is not as well known as some other nackages, but it has long been one of the more sophisticated packages for the PC. Relay Gold carries on that tradi-

As with Access, Relay Gold includes a highly sophisticated script language, which VM Personal Computing is billing as new generation." But the most intriguing of Relay Gold's advanced features is its multitasking capability. According to VM Personal Comsophisticated script language and the facility to hundle eight

puting, Relay Gold can swap files in two directions at once while still letting users type messages back and forth at the keyboard. The program will also let users work on applications programs during file trans-

fer. For more information on the aforementioned products, contact Microsoft Corp. in Bellevue, Wash., at (800) 426-9400; and VM Personal Computing Inc. in Danbury, Conn., at (203) 798-6755.

#### PC ADVISOR EDITED BY GUS VENDITTO

#### PC Advisor is a regular feature that helps readers find the right hardware and software to improve their productivity.

Getting Past 1-2-3's Chart Limitations I'm looking for a graphics program that can plot up to 100

pieces of data with Lotus's 1-2-3. That's more information than 1-2-3's charts can handle Peter Gordon

New York, New York

Actually, 1-2-3 can handle that much information, but the resulting graph would be unintelligible because of the program's formatting limitations.

There's plenty of software on the market that can produce coherent chorts on that scale and offer extra benefits that will enhance the chart's oppearance. In our June 11 issue ("Business Graphics: Giving Power to Presentotions." PC Magazine. Volume 4 Number 12), we reviewed 36 business-graphics software packages. Fifteen of those could handle your 1-2-3 files, but almost all of them require that you so through the tedious process of translating your spreodsheet into DIF formal before you can start, wasting time and storage space.

Two products reolly stond out far working with 1-2-3-based charts, however, Microsoft

Chart (\$250; Micrasoft Corp., Bellevue, WA 98009; (206) 828-8088) is o full-featured graphics program. It will accept 1-2-3's WKS files and help you build sophisticated charts with up to 512 bars or columns from the spreadsheet data. The Grafix Partner (\$149: Brightbill-Roberts Ltd., Syracuse, NY 13202: (315) 474-3400) is a utility that remains resident in memory while you work on your spreadsheet. Once you've had 1-2-3 draw its rather crude graph on-screen, you press Ctrl-Alt-+ and The Grafix Partner springs to life, ready to enhance your image with special touches. You can now add all the data that would have chaked 1-2-3. We reviewed The Grafix Partner in our October 1 issue

("A Partner in Graphics." PC Magazine Volume 4 Number A program that takes 1-2-3 PIC files and enhances the inage will be available soon. Called Freelance, it costs \$395.

Home Control

I'm still waiting for an issue of PC Mogozine to cover in detail the use of the PC to control the home-appliances, burglar alarms, and so on. I can think of many applications, but I need help to do it on my own.

> Jerry Anderson Yuma, Arizona

We generally stick to business uses of the PC in the mayazine because that's how our readers use their machines. But we did cover that topic in the December 25, 1985, issue ("Home Process Control: Domestic Help from Your PC." PC Magazinc, Valume 3 Number 25), giving highly detailed instructions on setting up a PC-based home-control system. The article explains how to tie your burglar alarm, lights, or any other appliance into your PC for about \$50 in parts and your own

However, if you don't know the difference between an elec-

labor.

trical relay and a 1-mile relay. you'd be better off looking into SmartHOME, a system from CyberLYNX [Boulder, CO. 80301: (800) SEC-URE91. The price will run anywhere from \$529 for a starter kit that controls one appliance to \$1,599 for a complete system contralling lights, thermostat, sprinklers, you name it. Smart-HOME is wireless: It hooks into your home's electrical system. Everything you need should be included, but your PC must have a graphics card to run the

Other systems are available. but they generally require fulltime use of the PC. The Cyber-LYNX system allows you to program a controller with the PC and then have the controller handle the system. The PC gets involved only when you want to change instructions

software.

If you have a question about products available for the IBM PC, the PC Advisor may be able to help. This column will research the question and make recommendations. Send your gueries to The PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016.



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-Kern Leichtman, PC Week.

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*The New York Times quote from the May 5, 1965 issue.

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CIRCLE 471 ON READER SERVICE CARD

Selling computer supplies may be no different from selling groceries, that is if the Nashua Corporation is correct. The New Hamoshire-based manufacturer of floppy disks has introduced an element of supermarket bingo to the micro market by inserting contest scratch cards in diskette boxes.

Diskette Bingo

Some lucky winner will get to drive away in a fancy 1986 Corvette. The other prizes, Nashua says, include VCRs, phones, and soft-bound books to implement a personal time-management system. According to director of marketing and sales Sherm Silverman, "This will be like nothing else you've ever seen in the diskette market."



#### Tongue Thaied

For a new word processing program to succeed, it should offer a competitive price and features. the competition doesn't have. With this dictum in mind, the Megachomp Company of Philadelphia sells DuangJan, bilingual Thai-English word proces-

sor, for \$19.95, plus \$3.25 shipping and handling Boonpat Vattan, a partner in the venture, says that the package is aimed at Thai students at-Sample:

สวัสดี

คณสบายดีหรือ?



tending schools in the United States. He says there has been some interest from university language departments and from the Thai embassy in Washing-

ton D.C. Vattan adds that he'd like to market the program in his homeland, where word processors are ROM-based and expensive, but he doesn't yet have the business connections. For more information about

DuangJan, a standalone package in either language, contact Megachomo at 3524 Cottman Ave., Philadelphia, PA 19149.

- Hello.
- How are
- Just so and ขอบคณครับ. so. Thank you.



#### Look for the Al Label . . .

Manufacturers of food and soap have long known that the best way to improve a product is to place a large "improved" sticker on the front of the box. Computer journalist Jim Seymour, amused by the proliferation of supposed artificial-intelligence products, has expanded that concept to the computer market in shopping mall kiosks by early by developing his own Al stick-1986 er (left), printed in yellow and designed to be stuck onto existing software packages.

#### Disk Drivers

Want to buy a car? Have a computer? Lincoln Mercury now advertises one via the other. Recently the company sent floppy disks extolling the virtues of Lincoln Mercury cars-particularly its I Ms-to more than 7,000 owners of IBM PCs and compatibles.

Putting Lincoln Mercury's product information on disk is cheaper than brochures and has a higher response rate, says Michael Slagter, advertising and merchandising coordinator for Lincoln Mcrcury Leasing. "Nobody would read a book on

our product, but it's fun on diskette," he says, adding that 10 percent of the disk recipients visited a dealer's showroom. To get a disk, call (800) 922-9073.

Not to be outdone, General Motors is using an interactive video disk system developed on the PC compatible TeleVideo PC by Visage Inc. of Natick, Mass., to give people walking around shopping malls a custom look at new cars. The Tele-Video system includes the PC. laser disk player, monitor, and laser disk controller with graphics overlay and data decoding. GM says the systems will be

> -Christopher Johnston and Robert Sehr

#### CompuServe Crime Watch

If the post office seems less crowded these days, maybe personal computers are at fault. We already know that electronic mail is skimming off some of the first-class and express-mail business. And now, the FBI's "Ten-Most-Wanted" list is

available electronically. CompuServe has made it pos-

sible for subscribers to call up the images of the FBI's ten most-wanted criminals. Downloading a scofflaw's picture and physical description and other vital statistics to disk or to a speedy printer takes about a minute per person.

Many of CompuServe's 230,000 subscribers, the service says, are doctors, dentists, and other health professionals. Sooner or later the crook will need a tooth fixed or a boil lanced, and a PC-using physician might recognize the wanted

There is another advantage to



the electronic "Wanted" posters. Criminals often try to disguise themselves with beards. wigs, or evenutches, and certain digitizing programs allow the images to be easily manipulated by alert citizens and law enforcement officials alike to see what a person would look like with those additions.

#### Drop Us a Line

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#### PC UPDATE BY VIRGINIA DUDEK

NEW YORK - Microsoft Corporation of Bellevue, Wash., has enhanced Microsoft Chart, a popular business graphics program. Version 2.0 now has direct links to outside spreadsheet programs. With one built-in keystroke, users can transfer data directly into Chart from Lotus 1-2-3. Symphony Multiplan, dBASE, and other micro and mainframe programs that use .WKS, DIF, or text files. Chart now supports more than 20 additional output devices, including the IBM ProPrinter and Color Inkjet, HP 7510, Polaroid Palette, VideoShow's presentation system, and other high density printers, phototypesetters, file recorders, and advanced presentation devices. In addition, 2.0 supports the IBM Enhanced Graphics Adapter (EGA). Users who purchased Chart 1.0 after July 23, 1985, will receive a free upgrade. Other registered owners can upgrade for \$50.

Samna Corporation of Atlanta, GA., announced release 3.1 of Samna+, a word processor that combines a spreadsheet and a wordbase manager. Revisions include faster document merge and reformatting, and support for DIF to facilitate data exchange between Samna+ and outside spreadsheet programs like Lotus. This "turbo" version also includes an enhanced spreadsheet directory, file sorting, and support for users who have draft and correspondence quality printers. Updates are \$50, or free if the previous version was purchased after July 23, 1985. Samna Word III users can upgrade to Samna+ for \$145.

SAS Institute Inc. of Cary, NC., has a new version of System 2000 Database Management. Release 11.5 provides Cross Memory Services support for the System 2000. Some of the support features include a reduction of commom storage area, no required relink of the MVS main memory nucleus, and increased data security. will also release in early 1986 an interface

between System 2000 and other programs in the SAS system of data analysis packages. Upgrades are free to current users.

Penguin Computer Consultants in San Jose, Calif., has upgraded its Maintenance and Inspection System, a computerized method for planning industrial or business maintenance. Version 4.0 has enhanced features for record keeping, multiple PC support, improved wild card selection on all select/sort screens, and a report writer that summarizes work in dollars. Updates are \$150 with a new manual.

Short takes: The Cambridge Software Collaborative announced Version 1.2 of Cambridge Spreadsheet Analyst, a debugging tool for Lotus users. It will incorporate 6 worksheet-wide reports, including an indexed, two-dimensional printout of cell contents and a condensed spreadsheet map. Updates are \$5 for current users Westford Systems of Still River, Mass., released Version 2.0 of Micro-Track, a computer usage recording and reporting package for the PC. Features include a logon/logoff facility with optional passwords, administrative control over user registration, unlimited 20 character account codes and more. Contact Westlake for updates Learned-Mahn of Boise, Idaho, announced

Version 2.0 of Contract Collection Manager, an accounting system for automatic contract collection and disbursement services. The new version allows users to process late charges, payment reminders and sales tax. It will also automate reserve accounting and 1099 and 1098 interest reporting. Version 2.0 will later be modified for networking and multi-user capabilities. Updates are free to current CCM users.

Be a contributar ta PC Update. Write ar call Virginia Dudek, PC Magazine, One Park Avenue, NY, NY 10016. (212) 503-5265

#### New IBM-Microsoft Pact Solidifies PC's Future

BY CHRISTOPHER JOHNSTON

BOCA RATON, Fla.-The creators of the IBM PC and the developers of its operating system renewed their vows with a long-term joint-development agreement that should ensure a healthy future for both Microsoft DOS and the IBM PC

The August agreement between IBM and Microsoft provides for collaboration on certain future system and product developments.

Although the agreement doesn't preclude IBM from using non-Microsoft systems. William C. Lowe, president of IBM's Entry Systems Division, said the IBM-Microsoft agreement means competitors and third-party vendors can be sure that the DOS system will remain compatible with their products: "We are committed to the openarchitecture concept and recog-

"I think it's great," said Duvid Wagman, co-chairman of Softsel, a software distributing

our customore

vides for future generations of the IBM machine, DOS 4.0, 5.0 and 6.0 Edward Esber, president of Ashton-Tate, agrees that finally knowing IBM's plans is valuable. "There has been considerable speculation about whether IBM is going to have its own

DOS. This deal removes that uncertainty, and anything that removes uncertainty is good. From what I understand, the deal will mostly cover systems software (such as DOS) rather than applinize the importance of this to cations software. If it were the latter. I'd be more concerned." Multitasking with a "concur-

bility, and this agreement pro-

rent DOS," networking, and a DOS for the 80286 chip (used

company. What we need is sta- on the PC AT) are a few of the thines Softsel's Wagman ex-

> Ashton-Tate's Esber sees hope for similar arrangements between IBM and Microsoft's competitors.

> Although IBM may claim to be thinking only about the microcomputer consumer when it enters into deals like the one with Microsoft, Wagman points out that certain antitrust requirements are also served by such an agreement. "Realistically, in this marketplace, everyone else exists by IBM's grace. If IBM wanted to own any segment of the market, it has the resources to own it. But it wants to keep

the Federal Trade Commission



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# Marriage of Voice, Data Wasn't Made in Heaven

Anyone who has used a modem knows that running today's digital signals along the last century's telephone wires is the electronic equivalent of fueling a steam locomotive with hydrazine. The results are apt to be spectacular; they are also chancy and none too predict-

Computer design engineers and corporate system managers face that potentially explosive situation every day as they struggle to mate steam-engine-vintage switchboard technology with space-age digital net-

worst.

Twisted pairs and coaxial cables of two different eras cannot lie peacefully side by side in the same wiring conduit. Economy and technology require the systems be combined into a signeentity. The result could be called many things; most likely, a beadache.

Today, the preferred match of computer and telephone involves a safer strategy that is the exact opposite of the technique modems use. It's called voice digitization.

Although voice digitization hasn't caught the attention of the press as computer graphics has, the odds are good that new combined voice-and-data net-works and telecommunicating computers that put speed and information on the same wires will make this field one of the hottest areas in the computing industry within the next few

All Natural, No Synthetics Although often lumped together with voice synthesis and voice recognition in a product class called "speed technology," voice digitization is an entirely separate process. Digitization neither creates nor understands; it only changes the form of speech from analog electrical signals into digital pulses the PC can process, store, or ignore.

Like voice synthesis, voice digitization can make your PC talk—the stored voice is just played back—and the quality can be simply fantastic. Unlike synthesized utterances, digitized dialogs don't sound like

your computer is gargling with crankcase oil. When done properly, digitization sounds as good as a tape recording. High quality should

osme rirst-rate naroware, the application of voice digitization is embryonic at best. The possibilities are just beginning to be explored.

The use of digitization, voice

The use of digitization, voice mail, digital delation, or voice annotation on a spreadsheet will eventually become commonplace and sound genuinely human with every influction perfectly preserved. Granted, you can record with the same quality on a \$19 cassette recorder as you can with a \$300 expansion beard in your \$3,000 PC. With a disk, however, you have random access to every phrase if you want it.



heavenly bodies from Jupiter to Jamie Lee Curtis and Arnold Schwarzenegar, you could use your PC for digital enhancement of sound. In theory, you could electronically sift intelligible voices from niles of noise.

#### Dialog/2 Digitizer

The voice digitizer I've been playing with is Dialog/2, manufactured by Dialogic Corp. Although designed for OEM applications, the company happily sells directly to end users and experimenters. The \$495 Dialog/2 includes a turn-your-computer-into-an-answering-machine modem on the board. Other Dialog models feature

different options.
Each Dialog board gives you a choice of three sampling rates—4, 6, and 8 kHz—and uses byte-sized quantization, for sound- quality choices that range from the likes of tele-

phones to radio broadcasts.

The demonstration software that accompanies the Dialog products will let you operate your PC as a tape recorder so that you can get familiar with the principle involved. Sample source code of programs in C, Pascal, and BASIC is also in-

More than a neat toy, a Dialog board is a good way to get yourself in on the ground floor of an upcoming technology.

The real power in voice digitization
mes from counling its technology with

comes from coupling its technology with the PC's decision-making abilities.

be expected because everyone's darling, the compact disk, is based on the same sound-digitization premise, taken to the nth degree.

degree. Of course, the technology has its disadvantages. Try voice digitization, and you'll quickly discover why compact disks had to wait for the near-gigabyte (1,000 megabytes) capacities offered by laser-optical recording technology. Recording digitized signals, even of mediocre sound quality, can grind through the memory capacity of a floppy disk about as fast as you can format one (a floppy holds only about 45 seconds of speech). Worse yet, the higher the sound quality you require, the more disk space you'll use. Voice digitization really demands that you have a Winches-

ter hard disk.
Despite the availability of

With a hard disk, you won't even have to worry about wearing out the media because, as with a laser disk, the hard disk does not suffer head wear from disk contact

The real power in voice digitation comes from coupling its technology with the PC's decision-making abilities. Your computer can decide what to say to suit special situations and contingencies. Your PC could issue instantly understandable verbal warnings in genuinely urgent tones when disk space, or your bank balance, gets too low—or when the lathe it is controlling in a machine shop takes a turn for the worse.

Once sounds are stored in digital form, you can manipulate them mathematically. Much as the image-enhancement programs NASA engineers have used on pictures of Dialog Series Dialogic Corp. 60 Baldwin Rd. Parsippany, NJ 07054 (201) 334-8450

Llst Price: Dialog/1, \$295; Dialog/2, \$495; Dialog/3, \$595.

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TRIAL.

PERIOD

# IBM Hands Us A Crystal Ball

IBM's recent announcements about its plans regarding the PC II and the company's operating-system development agreement with Microsoft are helping the rest of us make our own plans.

BM has created a huge problem for journalists. Twice in as many months it has behaved in a responsible, consumer-conscious manner. It's enough to give anyone covering the industry fits. After all, where are the easy targets if IBM starts playing fair?

The first announcement came when new Entry Systems Division head William Lowe announced that delivery of the PC II was not imminent. Consumers, from corporate purchasers to individual users, no longer had to worry that they were doing the wrong thing. Here at PC Magazine. several months before the announcement we were putting together an order for a large number of machines to equip our growing editorial staff. Should we go with PCs, XTs, and ATs? Should we wait for the PC II? So. Mike O'Cone, our producttesting editor, called his most reliable source at IBM, Deep Chip.

"Hi, Chip. Mike here. How's it going?

"Is this for publication?" asked Chip. "Naw. I just need some background before I commit some major dollars." "Okay, shoot,"

"When is the PC II coming out?" "It is IBM's policy never to comment on unannounced . . .

"Okay, already, Chip! This is me, "Well, you know I can't answer a question like that. Try asking it another

Mike thought a moment, "Would I be making a mistake if I were to purchase a significant number of PCs now for office applications and networking?"

"No," was Deep Chip's reply.

"Would I look like a fool 6 months from now?" "No "

"Chip, you're one swell fellow. I owe you a beer next time I'm in Boca." For obvious reasons, we didn't publi-



Bill Machrone

cize O'Cone's conversation with Deep Chip. Like us, however, others wondered if they'd get burned by buying a machine that was soon to be phased out.

Since the beginning of the commercial computer industry, the fortunes of other companies have risen or fallen on what IBM was going to do. The compatibles manufacturers wondered what hoop they were going to have to jump through next. The corporate purchasers, like us, wondered if they were going to miscommit their capital equipment budgets. Individgal purchasers and small businesses wondered if there would be a dramatic price drop in the old PC.

a systems analyst. His 14-year-old son Matthew has known every poke and hack on the Apple II for years. Anthony felt it was time for Matthew to "graduate" to a machine with more potential. He asked me if he should get an XT, an AT, or just wait. Since they planned on getting down and dirty at the assembly language level with the processor, I felt the XT would provide lots of challenge, especially since a DOS that uses the extended capabilities of the AT's 80286 is still far off

They cut a very good deal with one of our mail-order advertisers, and while they were waiting for the UPS truck, I gave Matthew a brand-new conv of Turbo Pascal. By the time the machine arrived, he had read the manual and written half a dozen programs. Someday, when he's old enough, one of you will hire him. You're gonna thank me.

#### The Other Shoe

The other IBM announcement is actually even more important to the future of the industry. That, of course, is the agreement with Microsoft for long-term joint development of operating systems for personal computers. Since the operating system is the "glue" that holds the individual parts of the computer together, it is also the means by which compatibles manufacturers ensure that their products will work like IBM's. Likewise, software companies need a known operating environment in order to be sure that their programs will run on a given machine and will work on fu-

ture versions of the machine, as well. It's always dangerous to read between the lines of press releases, especially when Take, for example, my friend Anthony, the companies are as canny as IBM and

Microsoft. But the topic is "advanced operating systems." To me, that means an operating system that encompasses a visual shell such as IBM's Top View or Microsoft's Windows

Industry pundits have long claimed that Top View "contains 60 percent of an operating system" and that it would be trivial for IBM to add the additional 40 percent and thereby shut Microsoft out of its sys-

tems. They point to the past, in which IBM has never depended on anyone for its operating system software. They point to the future, as IBM phases out the AT's benighted CMI disk drives and switches over to PC AT hard disks of its own manufacture. I disagree. When I read between the lines, I see a convergent course for Top View and Windows.

Top View, for example, does a masterful job of controlling even the most unruly programs, ones that barely follow the rules for DOS compatibility. It has a fundamental understanding of the PC's interrupt structure, one that allows the round-robin task scheduler to mix communications programs, disk access, and screen update without skipping a beat. What it doesn't do is handle graphics.

Windows does an uncommonly good job of handling graphics, especially on IBM's Enhanced Graphics Adapter, Top View doesn't know the EGA exists. Windows comes with enough SideKick-like utilities to make Borland's Philippe Kahn wince: Top View offers next to nothing. Both integrate smoothly into DOS. Either could make DOS more than it is.

We've just seen In-a-Vision, the first applications program for Windows, by Micrografx. It's a CAD program, one that uses Windows's virtual device interface to best advantage. Microsoft saved Micrografx hundreds of hours of programming time by providing all the screen and printer drivers. If a hardware setup works with Windows, it works with In-a-Vision, period. That's progress!

In-a-Vision was actually commercially available before Windows, and it's still available and functional without the Windows package-it comes with a run-time version of Windows that only operates when In-a-Vision is active.

What surprised us (and Bill Gates) was how fast In-a-Vision works. It uses both vector and raster images in the same screens, coupled with sophisticated database techniques for recording the images to disk. But it wouldn't be half the product it is without Windows, Windows, meanwhile, is an infinitely safer bet for software manufacturers now that IBM and Microsoft have announced the accord that will propel us toward ever-greater functionality and ease of use. I can hardly wait.



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# Letters to PC Magazine

#### Easy-to-Reach DBMS

Thank you for reviewing our reQuest in "The Latest in Databases" (PC Magazine, Volume 4 Number 14). We're glad that PC Magazine agrees that a DBMS should be both powerful and easy to use. But some of your readers might not have such an easy time reaching us through the phone number that was given in the review. Our correct number is (800) 321-DRMS

Your readers might also like to know that we have released Version 4.1 of re-Quest, which no longer supports floppy operations: reQuest must be used on a hard Dave Christovich

System Automation Software Inc. Silver Spring, Maryland

#### Entrepreneurial Spirit

I was truly disappointed in Peter Norton's "Striving for Practical Perfection" column (PC Magazine, Volume 4 Number 16). Has Norton forgotten how the microcomputer revolution started? People like him are where they are today because computer users took a chance on a new product from an unknown. Most microcomputer users have a natural pioneering spirit, and taking a chance with new products can be very rewarding.

The computer revolution has been fueled by the upstarts and entrepreneurs, not only by the established firms. Where would Norton be today if everybody had stuck with established firms? He wouldn't be a writer for PC Magazine and the rest of us would still be losing our files. So Norton, while a little caution is always called for, don't turn your back on the essence of what got you here. The needs of many cannot always be provided by the few. Jacob Turk

Lee's Summit, Missouri

#### The Inimitable Winn L. Rosch

In the July 9th issue of PC Magazine (Volume 4 Number 14), I counted three articles written by Winn L. Rosch: one on auto-

matic backup software ("Backing Up Made Easy"), another on optical readers ("The Oberon Omni-Reader: Recognition Becomes Affordable"), and the third-his regular column-on screen filters ("For Your Eyes Only: Monitoring PC Usage"). In another publication also dated July 9, 1985, by coincidence, the ubiquitous Rosch has no fewer than seven articles on computer graphics to his credit, not including two rather substantial sidebars.



Rosch is one of my favorite writers and commentators on the computer scene. But my question is, does this guy ever eat or sleep? Or is "Winn L. Rosch" a cleverly manufactured pseudonym, complete with smiling picture, for a sweatshop full of PC Magazine writers chained to their CRTs?

Diderik Finne New York, New York

#### **Keyboard Concerns**

In PC Magazine's review of ProENT's keyboard ("ProENT's Half-Size PC Keyboard Proves that Smaller Isn't Enough, PC Magazine, Volume 4 Number 18, page 226). James Langdell refers to the QWERTY keyboard layout as "that deliberately finger-slowing system." This belief now seems to be accepted as the gospel truth among the PC community. However, an article by Gentner and Norman in the March 1984 issue of Psychology Today describes research at the University of Califomia at San Diego that clearly shows the PC community knows not whereof it

According to the article, the researchers found that the OWERTY keyboard was standard more than 25 years before touchtyping became popular. Until then, typists generally used the hunt-and-peck system, which didn't threaten the mechanics of the nascent typewriter.

It appears that in the 1860s, Christopher Lathan Sholes came upon a screndipitous keyboard arrangement that is only slightly less efficient than the modern (that is, 1936) Dvorak-Dealey keyboard. As a confirmed PC user, I am certainly

no technophobe. However, I believe credit should be given where due, even if it requires that you acknowledge the efforts of our poor, unenlightened PC-less ancestors. Passing off falsehoods as truth does nothing to foster the growth of important developments.

Michael McCov Baltimore, Maryland

#### Read the Fine Print First

As a Western Union EasyLink subscriber. I read Barbara Krasnoff's well-written article on electronic-mail systems with great interest ("In Touch with the Outside World," PC Magazine, Volume 4 Number 18). It seems that Western Union is trying to sell its service to your readers in part on its affordability-an optional \$25 "annual" fee in lieu of a \$25 monthly fee.

When I acquired a telex machine this past spring, the company that sold it to me touted the optional annual fee's merits, and I fell for it. Two months later, a computerized statement arrived enclosed in my June 15 Western Union telex bill. It announced that "we are now charging a monthly fee for your first telex number.

This \$25 fee can't apply to me, I smugly told myself, because I have an annual agreement with Western Union.

I soon learned the joke was on me. If I had read the back of my subscription agreement, I would have noticed that prices are subject to change. Duly chastised. I fired off a letter to Western Union corporate headquarters noting my dismay with its business practices. I am still awaiting a response, but I have resigned myself to the fact that I have been had.

Then your article passed my desk with





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#### LETTERS TO PC MAGAZINE

mention of the same annual subscription fee. My angry call to Western Union went unanswered because its consumer affairs office was closed because management



had to fill vital positions during a union strike.

I hope others read this before getting involved with Western Union. To be forewarned is to be forearmed.

David H. Roots Poolesville, Maryland

As of the writing of the article, all fees for Western Union's EasyLink were verified.—Ed.

#### A Simpler dBASE Conversion In a recent Power User column, Robert

Carroll explained how to convert a dBASE data file to a WordStartMadilMerge file ("dBASE-WordStartMadilMerge Connection," PC Magazine, Volume 4 Number 18), While his program does work, I have a much simpler method of doing this conversion.

When you have completed your dBASE data file and are ready to convert it for MailMerge, you simply use the dBASE command

COPY TO wsdata.dta DELIMITED WITH ,

I have used this dBASE command on a number of occasions without problems. This dBASE command also works for conwerting dBASE files to basic .DAT files. The only difference is to delimit with quotation marks (") instead of a comma. You can also have numeric as well as character fields in the conversion.

Ted Hall Washington Court House, Ohio

David Obregón replies: The dBASE command you've listed places

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## FREELANCE

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commas after each field, while stripping away trailing blanks. However, if you have a comma within the field's data (such as "Computer Co., Inc."), MailMerge will treat the data after the embedded comma as an entirely new field. This will cause



incorrect tracking of all subsequent data by the program. This can wreak havoc with the MailMerge-produced documents you're preparing.

The whole method you've mentioned, delimiting with quantism marks (often used by novices as a MailMerge conversion process) is acceptable by MailMerge and does allow comma in the field's date. However, it doesn't strip away trailing blanks from the included fields. The whole this placed within the delimiting marks. Thus, a letter including these fields can have such spacing oddities as "Dear methot of these procession of the procession of t

Mr. Carroll's short program copes with these two common problems by delimiting data with both commas and quotation marks. This produces an ASCII data file of fields with embedded commas safely defined for MailMerge use and without trailing blanks.

#### Backing Up Redux

In reference to your July 9th article "Backing Up Made Easy," (PC Magazine, Volume 4 Number 14). I would like to clarify some of the comments made by Winn L. Rosch about our automated Gemini Backup program.

First of all, the Gemini Backup status messages provide information about Gemin's current operating state, something desirable to many users. The messages may be turned off by simply answering Yes to the "Turn off status message?" question during installation.

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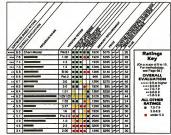
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If you'd first like to see the evidence for yourself, send in the coupon below. We'll send you a copy of the July 1985 issue of Software Digest, which evaluates and ranks the industry's 17 top business graphics software—at no cost.

When it comes to choosing the best graphics software for your business, we think you should feel free to be the judge.

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#### LETTERS TO PC MAGAZINE

Second, Gemini Backup maintains the original file attributes on backup copies. The backup files are made read-only only if the original file on the hard disk is readonly.

Third, when restoring files, if accurate dates were kept, the user can insert disks in any order. Because Gemin's restore procedure is fully menu driven, we feel that it is significantly easier to use than DOS's RESTORE command.

Fourth, virtually no time is spent making backups. Backups can either be completed in the background while users continue with their other work, or backups can

be made in the foreground.

With these clarifications in mind, we thank you for an otherwise excellent review.

William Poole President Gemini Software Providence, Rhode Island

Corrections

Marty Alpert, president of Tecmar, has clarified a statement reported in PC News ("Marty Alpert: Building an Add-On Empire," PC Magazine, Volume 4 Number 14, page 50. Alpert intended to say that sales of Tecmar products through IBM Product Centers have been favorable.

In our printer issue (PC Magazine, Volume 4 Number 19), we failed to identify the Epson FX-85 (page 108) and the Centronics Printstation 240 (page 152) as Editor's Choices, Also, we incorrectly labeled the Star Micronics SR-15 (page 140) and the Centronics Printstation 351 PC (page 164) as Editor's Choices; they were not. We rezer these errors.

How to Write to PC Magazine

Do you have a comment, compliment, or criticism about something you've read in PC Magazine? Is there a question you'd like to open up to other readers? Send it to Letters to PC Magazine, PC Magazine, One Park Avenue, New York, NY 10016. We regret that we are not able to answer letters personally.

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Introducing 1-2-3 Release 2 from Lotus.*

New 1-2-3 is more powerful and a lot more versatile.

You wanted to handle larger jobs with 1-23. Now you can. The new 1-2-3 worksheer has been expanded to 8192 rows - drimes its original size. And your worksheer is actually more flexible because advanced memory management allows data to be stored anywhere on the worksheet. When used with new expanded memory boards, new 1-2-3 can address memory beand for the property of the

New 1-2-3 is designed to support the Intel® 8087/80287 math coproces sors soyou can now do many calculations faster. We've even added some features that make it possible to do things like regression analysis, string functions and string arthmetic. And new 1-2-3 comes with 40 new macro commands so you can work more efficiently and a lot more productively.

Now you can start 1-2-3 directly off a hard disk without putting a system disk in the floppy disk drive.

But we still kept things simple.
In many respects, new 1-2-3 isn

In many respects, new 1-2-3 isn't any different from the original. You wanted us to keep things simple and we did. If you're already familiar with 1-2-3, you're ready to use new 1-2-3. You don't have to retrain. And new 1-2-3 can read and process existing 1-2-3 files so that virtually all applications already developed can easily be used.

It's even easy to upgrade to new 1-2-3.

If you're a registered 1-2-3 user and want to upgrade to new 1-2-3, you'll find all the details in a mailing from Lotus. If you haven't registered yet, complete and send in your Warranty Registration Card or call 1-800-TRADEUP* so we can send you the mailing.

The cost of the Upgrade product is \$150. You are eligible for a free upgrade if you purchased 1-2-3

Release 1A on or after April 24, 1985. And for everyone who upgrades, there's also a rebate offer of \$40 on the Intel Above" Board, the first expanded memory board certified by Lotus.

We think you'll find new 1-2-3 the best thing since, well, 1-2-3.



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some distance) appermeasons (by quite and are simply the best value in diskettes available today

#### The torture test.

Than borrure cear.

Considering Walsah's earlier distinct registring, I wasn't exactly a true believer when their Director of Marketing came into my office with samples. So I book a boar at random, selected a disk; bent the thing every which way and slipper til into my IBM-PC. It formatted, it beothal it stored and entireded data.

Thet wasn't enough. I gave samples of the discinter to Curt Rostenbach and, in turn, to Tom Streft, both hockers of long experience and members of the Washingan (filmos) Apple Users Group. Tom really went at it

om reasy won at it.
He sook a quarth-halogon larno, amed it at the diskette use!
It stated be smoke [and mett], and then formatise, booled
the observa as made and referred data?
It is considered to the considered of the considered of the considered by our other larger of the considered of the consid

He simply best the diskette every which way and it shill

tormatted, booled and ran on his Apple The best buy I've ever seen.

The best buy the ever seen.

OISK WORLD, it is sale more tested engined media by mail-order than anyone dist in the world!

I, as President of the cooperation, wold tolerate a product.

I also do not the companies who try to mits a "quality" or present and only the companies who try to mits a "quality" or premain maps of a higher price like Dysan and Versalm did until they failed.

As President DISK WORLD, loc, my motto is simple "the best diskette for the least amount of money

Wabash is it. Bight now there is no hetter value than the Wahach Pinnarin Series of diskettes Series of disaction
Granted, you have to buy a hundred at a time, but so what
Spirt the order with friends, relatives, co-workers or even you

The key thing is to get the most diskette for the money.



off is Our first order for Wabash Pinnacie Diskettes was

That's an awful lot of tarth and confidence but, then again, I have the diskette that Tom Street Interally melted and kept on numering The truth about \$1.00 or less diskettes

More and more ads are popping up offering diskettes for By the same token, more and more people who were sell by the same times. The same and the pooling distrettes by mail.

We did a little survey of current ads for distrettes advertised. for a dollar or less and did some analysis of the market and here's what we found as it applies to 5.25" DSDD diskettes "supposedly" selling for a dollar or less.

ACTUAL ADVERTISED PRICE LDW PRICE PER 100: VENDOR: 99 ea 95 ea aneon nowter Club Communications & Electronics Precision Data Diskette Cornec Comp Soft Serv 49 63

The real truth about \$1.00 or less diskettes It costs all diskette manufacturers about the same to p duce a diskettle. Some may charge more because they want to project a "premium quality" image, als the late, lamented Dysan who bought their basic media from SM. Some charge less because they sell a sub-standard prod-

99 ea Unspeci 92 ea Wabash

I and we're not looksh enough to name names here But here's the truth about the \$1,00 or less diskette market. Talls into four categories
The DISK WDRLD's of the universe who si

that they can buy first quality product in massive quantities and choose to pass on the savings to you. (Precision Data and Diskette Connection on BRAND NAME products also tall into

2 The people who buy "cosmos", stuff from major manufacturers that usually fitts quality control standards, but is cosmercially blemished and thus call tips packaged and sold

commercially bifurnished and thus can't be packaged and sold under the manufactured is own name.

3 "Deplocated Dusting "Uncervised medics, southly before
3 "Deplocated Dusting" Uncervised medics, southly before
Ministry of the Commercial Sold on an "assis" bases with the undershading that the manufacture is name will never be divided (bossis) by about a 20" kneep care of the Sold Obstandance of less than 17 1000th of 1% registry manufacture is not proposed to IDSIs Workpart and Neet to graduate the souther of manufacture of divided before the souther of manufacture and the sold proposed to IDSIs Workpart and Neet to graduate the sold proposed to IDSIs Workpart and Neet to graduate the sold proposed to IDSIs Workpart and Neet to IDSIs with the sold proposed to IDSIs with the IDSIs w

dollar or less. dollar of less.

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Finally, the Tarwarese counterfeners are moving into the act.

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ne Critical Factor.

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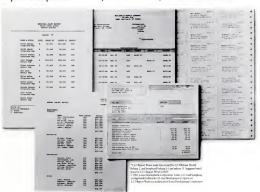
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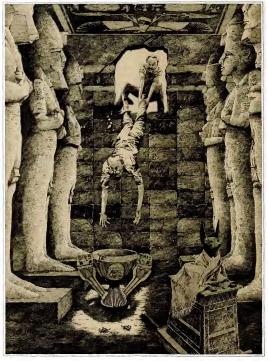
If you're familiar with 1-2-3,

you'll immediately feel comfortable with 1-2-3 Report Writer. Similar menus and prompts guide you until you have exactly the report you want. It's that easy.

If you'd like to make your database look better, look at 1-23 Report Whiter from Lotus: For more information, see your local authorized Lotus dealer. Or for a demonstration of 1-2-3 Report Writer, send \$5.00 along with your name and address to 1-2-3 Report Writer Demo Disk, Dept. NC, P.O. Box 4036, Woburn, MA 01888.







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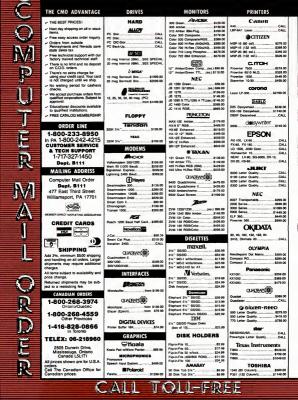
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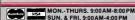
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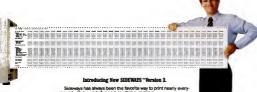
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## Color Me Enhanced

Amid unrelated complaints of not always getting what he wants, Norton continues his examination of the EGA. This time he unravels some of the mysteries of the adapter's 64 colors.

n my last column, 1 began a discussion of IBM's latest-and-greatest display adapter for the PC family, the Enhanced Graphics Adapter (EGA). I'd like to continue on that topic and also to remark on some interesting ways that the EGA board works with the matching Enhanced Color Display (ECD).

But first. I have something to get off my chest: I've come across some pretty ironic situations in my endeavors to help keep you well informed about what's going on in the PC realm.

#### Portable Irony

For example, Portable PCs are a topic that's been coming and going. You'd all like to see a good one, but some heroic attempts at creating one-such as the Data General/One-have been considerable flons. Still, engineers keep on trying, and now there's a whole new crop of them.

The one I think is probably the best is the Ericsson Ergo Portable: I like it, but I haven't been able to look at it in denth because Ericsson won't lend me one to check out. While I can't get my hands on a machine I think I really want to praise, some other portables have been arriving on my doorstep in droves. One, the Morrow Pivot II, I thought was junk; another, the Dataview 25, I kind of liked, except that its screen is as unreadable as the DG/1's. So for now, I'm recommending the Ericsson (1 think).

However, please don't think that this job is full of freebies. I spend a fortune buying stuff that was lent to me for review but is just too good for me to send back. It's an expensive habit, being tempted by all those goodies. Getting to play with a bunch of the latest hardware and software can be very hazardous to your pocketbook.

But enough of that. Let's get back to the real subject of this column-the EGA board and the ECD.

The EGA is 1BM's kitchen-sink display adapter, the board that will do nearly everything. The EGA can substitute for either of IBM's original two display adapters-the monochrome adapter and the color/graphics adapter. When the EGA



stands in for these other adapters, it can, for example, add Hercules-type monochrome graphics to the basic monochrome text mode. But the real glory of the EGA comes when it works in its special new modes designed specifically for the ECD.

#### Primary Interest The most interesting thing about the

EGA and ECD is their ability to produce 64 colors, four times as many as the PC's standard complement of 16 colors. But through an interesting design scheme, the ECD manages to remain compatible with the original color/graphics adapter.

The original color design for the PC incorporated four binary components of color, they could be activated in any combination, that is in 24, or 16, different

arrangements. These four components of color are the three primary colors, red, green, and blue,

and an intensity (or brightness) component. The RGB acronym is used to describe the kind of display screen that works with this color scheme, but this technical design for color is best described by IRGB. referring to all four components of the

The PC uses two steps to produce the 16 colors. First, the PC works out all the combinations of the three color signals: white (RGB, all three on), red (R only), green (G only), blue (B only), brown or dim yellow (R and G), evan (G and B), magenta (R and B), and black (all three off). The other step involves turning on the intensity bit in order to get brighter versions of each of the 8 main colors.

#### When I'm 64

The ECD can produce a total of 64 different colors. Those colors are purer and brighter than those of the PC because the ECD mixes in different degrees of the base colors rather than just cranking up the intensity the way the old display did.

This new color design uses two separate signals for each of the three primary colors. It has two red signals, for example, one twice as bright as the other. To differentiate between the bright and dim signals. they are called, respectively, R and r. Having two red signals allows you to have four distinct levels of red: none (all off), low (r only), medium (R only), and high (R and r). Numerically, the four levels are 0, 1, 2, and 3.

Each of the three primary colors-red, green, and blue-has its own pair of color signals, giving each four independent levels of color intensity. All of the combinations-43-give you 64 different color combinations. To signify which color bits are in use, the notation is RrGgBb, 6 bits.

To be compatible with the PC's original 16-color scheme, the ECD has to have a way of mapping the old colors, a 4-bit

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IRGB scheme, into its new 6-bit RrGgBb | scheme.

To do this, the ECD applies the old color bits directly to the brighter of the two new color bits: So old R activates new R, and so forth. The old intensity bit I activates all three of the new dimmer colors (r. g, and b). These three dimmer colors together make a dim white, which, like the old intensity bit, makes other color combinations brighter and lighter without changing the hue.

But there is one anomaly in this translation scheme. In the PC's standard complement of colors, r+g is either brown or yellow. But in the high-intensity version, it is described as either yellow or bright yellow. This confusion is caused by the delicate interaction between human perception and the technical workings of light and display screens. Depending on how the scales of human perception and psychology tip, you may see two colors as either quite distinct or as simply variations on the same basic color.

Brown seems to be one of those colors that's hard to nail down. Is brown a color? Or is it essentially a dark version of vellow or orange? On a PC, when you mix red and green in high intensity, you call it yellow (or maybe bright yellow). When you mix red and green in low intensity, you get what some people might call brown. Others, however, might call it plain yellow, or dark vellow, or even orange, (Orange isn't a color we hear of much in the PC color scheme. Odd isn't it?)

#### Brown Out

But IBM seems to be determined to make this old-fashioned red-and-green color combination appear brown to everyone. The ECD achieves this brown color by fiddling with one-and only one-element in the otherwise consistent colortranslation pattern, namely the red-andgreen combination. Remember that when the old scheme of RGB color signals is translated into the ECD's new RrGgBb color scheme, each of the old primary colors is directly translated into the higher of the two new primary colors. But to make brown, the ECD translates only the red part of the old scheme into the brighter red (R) of the new scheme. The green part of the old is translated into the dimmer green

(g). So instead of the expected RG signal, 1 you get an Rg (bright red, dim green) signal. That little trick alters the resulting col-

or and makes it closer to what your eyes will see as brown and not something that's

vellowish or (heaven forbid) orangish.

There are, of course, many more wonders to explore in the EGA/ECD hardware combination. We'll look into some more in the future.

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Manx Axtec C86 is heavily bundled with special features and utilities. Features described below are for the Astec C86-c and Astec C86-d systems. Features that are only available with Manx Aztec C86-c

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Optimized C compiler: Unsurpassed for code quality and speed. Optionally generates 80186 and 80286 code, Full K & R.

Symbolic Debugger: Execution trace, break points, display data in floating point, integer, char-acter, or hex format. Evaluate expressions. Detect illegal memory stores, modify memory/registers, dis-

nble cod Manx AS86 Macro Assembler; Supports macroes, 8086, 80186, and 80286 instructions in Intel

format. Past execution. LN86 Overlay Linker: Links small, large, and mixed memory model routines. Supports overlays, and options for producing ROM based code. Librarian: Build and modify personal or system

run time libraries.

8087/80287 Sensing Library: One library sin lates floating point, another assumes the presence of an 8087 or 80287 math chip, the third senses the existence of a math chip, and if it finds one it uses it. Profiler: Provides a run time analysis of your code

to prinpoint code segments to optimize.

UNIX Liberary: Compatible with UNIX C. Past
I/O. Terminal I/O can be buffered or unbuffered. DOS Library: Time and date functions, program forking (exec), program chaining, directory commands, I/O port support, sysint support, BIOS func-tions, and BDOS functions.

Screen & Graphics Library: Screen and cursor functions. Past routines for drawing lines, circles, ellipses, points, and setting colors.

CPM-86 Library (-c): Produce programs for CPIM-86. Large Memory Model: Manx Aztec C86 supports

programs and data of any size. Global data has a max size of 64k Intel Object Option: Interface to software that reires Intel object format, such as PLINK-86

Z (vi) Source Editor (<): Fast, powerful editor, macro capabilities, undo, ctags, buffers for commands and data, and all the bells and whistles that

make vi fanatics fanatical. ROM Support Package (-c): Startup routine, linker options for separate placement of code and data, special utilities like the Intel HEX Utility, documention, and library source

Library Source Code (-c): UNIX, screen, graphics, and math function libraries.

Mixed Memory Models (-c): Mix large code and

small data, small code and large data, or mix within UniTools (-c): The UNIX utilities make, diff, and

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One year of updates (-c): As new versions are released, updates are automatically sent. Technical Support: Manx has a full time staff to

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Aztec C86-o Personal System Aztec C86 z Apprentice System Manx Cross Development Systems

Manx Aztec C compilers are available as native or as cross development systems for PC-DOS, MS-DOS, Macintosh, CPIM-86, CPIM-80, TRSDOS, Apple II. and Commodore 64/128.

Cross development involves two computer systems: the development system (HOST) and the exec-utive system (TARGET). This method is useful when the TARGET machine is slower or more limited than the HOST

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development to the 68000, 65816, Amiga, Cl28, CP/M-68K, VRTX and others. How To Become a Manx-Aztec C User Call 1-800-221-0440 or 1-800-832-9273 (800

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able for Manx Agtec C compilers for MS-DOS, CPIM-86 and CPIM-80. PANEL \$295: Create screens via simple, powerful editing commands. Select colors, edit fields, Direct-

ly input data to a multi-keyed file util SunScreen \$99: Create and modify formatted

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# **NETWORK NEWS**

Vol. 1, No. 4

A GUIDE TO THE PROMISED LAN®

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#### PROLAN Professional Networking Products The Complete LAN Solution

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PROLAN Passive Hub 4

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PROLAN DeteDrive
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PROLAN DataDrives are external hard disk

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The PROLAN X-1220 is identical to the PRO-LAN X-1210 except that it also includes support for two Floppy Disk drives. Use the PRO-LAN X-1220 to free up an additional bus slot.

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## Goodbye, Gutenberg!

Within the next 15 years, the printed book may be replaced by notebook-style computers with optical disk readers. The reasons, notes Gary Kildall in this interview, are mainly economic.

The impending demise of print is simply a matter of economics, says four Kildell. It already costs less to produce a compost disk read-only seemory (CD ROM) optical disk platter that shoks 550 megabyse—the equivalent of about 200 printed books—than it does to print the same amount of information on paper. Today a CD ROM costs just \$4 per sidk for 1,000 copies, \$2.50 each in quantities of 10,000, and less than \$1 each for 100,000 copies.

Thus, printed books could be replaced by electronic systems within 15 years, claims Kildall. "We are moving very quickly to the point where the printed page is going to be an artifact of the past—it's going to be kistory."

Killall, who designed the CP/M operating system and founded Digital Research Inc. (DRI), has started a new company— Activenture Corporation—to develop database retrieval software for optical disks in order to capitalize on the electronic revolution. Kildall remains chairman of the board at DRI, which is conveniently located just across the street from his new offices.

I recently spent a few hours talking with Kildall at his office in Monterey, California, about where electronic publishing is heading in the next few years.

R.J.: Inexpensive (\$500) CD ROM disk drives for use with personal computers are expected soon from Atari and from several other computer manufacturers. Are these drives the key to the electronic publishing revolution?

G.K.: Although these desktop CD ROM units are important, what's really needed to make electronic publishing "take off" is something like Alan Kay's Dynabook.

Kay—who now works on advanced re-

search at Apple Computer-came up with

the idea for Dynabook in 1968 when he saw an early flat-panel computer display. He envisioned the Dynabook as a powerful, thin, and lightweight notebook computer with a high-resolution flat screen and a simple, intuitive user interface. During



Ron Jeffries

the 1970s, Kay worked on several versions of the Dynabock at Xerox 's Plab Alto Research Center (PARC). Although a variety of notebook computers are on the market one of the current crop approach the ambitious specifications of Kay's dream machine. To date, the Dynabock remains a wonderful idea, but it isn't a real product you can buy.

However, advances in computer technology will soon change all that In about 5 years, you should be able to buy a Dynabook-style notebook computer with a right, readable 8½- by 11-in-fingh-resolution monochrome display, fast 32-bit processor, several megabytes of RAM memory, and an internal CD ROM optical disk drive that stores half a gipatyte.

R.J.: Will the printed book be replaced by electronic forms of publication?

G.K.: Not right away. After all, we've had printed books for 500 years, so it's spong to take a white to displace them. You have to realize that most changes in our scely are based on economies. With CD occupance of the control of

R.J.: How does the cost of creating material for electronic publishing compare with the costs of producing traditional printed material?

G.K.: For regular text, it's about the same. The big reference publishers are already doing page formatting with their on typesetting codes. But an electronic book has far more potential. For example, there's a program befinial. For example, there's a program befinial picture that animates is. This requires a combination of applic design, computer programming, and movie animation. You need to script and acceptomet these sequences, much like want to have an actor as Gailico Giossings want to have an actor as Gailico Giossing, of Copenican theory. At that point you have

a movie production. Naturally these more

ambitious approaches cost considerably

more to produce than a disk that has only static text and graphics.

R.J.: How many CD ROM titles will be available in 1987?

G.K.: This Christmas three titles will be available, and a year from now you'll see somewhere between 20 and 40 consumeroriented CD ROM titles. In 1987 there should be 100 or so titles. By 1990 you'll see the Dynabook. That won't be the end of the printed page, but by then the electronic form will be very important.

R.J.: When will electronic forms of publishing overtake printing?

G.K.: We can easily say that in the year 2000 electronic publishing will be the only reasonable way to present all the material we have. We'll be able to demonstrate by the middle of 1986 that electronic publishing is the wave of the future. How easily our society can make the transition-eiven the tremendous investment in libraries and the printing industry-is an interesting issue. But economics will drive it. At some point we know it will happen; it just depends on how quickly people accept the technology. Electronic publishing on CD ROMs could give us the kind of spark that personal computing did a few years ago. It has the potential of doing a hundred times more than what personal computing did over the same period of time.

R.J.: What type of CD ROM books will be published?

G.K.: At first, mainly reference materials, study aids, and educational materials attiff that's helpful in a library. Library applications generally involve lots of cross-references and searching. In libraries and schools you are often trying to find something, and as soon as you need to search, information on optical disks immediately becomes cost effective.

R.J.: Will there generally be a single book per CD ROM, even though there's space for much more?

G.K.: I try to convince people to not wory about filling the 550 megabytes. Most people don't care whether the disk is full or not. They want value. If you have a disk that's only 10 percent full but charge \$15 and the customer is getting sufficient value for it, the fact that it is 90 percent empty is of no consequence to anybody. We'll see some logical groupings and a lot of single, self-contained volumes.

R.J.: Will we always have printed magazines and newspapers?

G.K.: "Always" is a very long time! Seriously—we will have printed newspapers and magazines for some time because of



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convenience. They are easy to read on a subway or an airplane; you can fold them up and that sort of thing. It really depends on the means of delivery: When the notebook style of computer, such as Alan

Kay's Dynabook, becomes as cheap and easy to use as flipping through a magazine, there will be no need for magazines. We may be talking about the year 2000 again, which really isn't all that far off.

As we become evén more of an information society—where all information is machine readable and the wealth of information constantly grows—completely electronic distribution may be the only feasible way to carry on. It's like the 1890 United States census, when Herman Hollerith invented his tabulating machine. They found they couldn't have done all the calculations for the next census in time

without that machine. We are getting into

that same situation right now. Many libraries—unless extremely well endowed can't handle even a small fraction of the

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When the notebook style of computer, such as Alan Kay's Dynabook, becomes as cheap and easy to use as flipping the pages of a magazine.

there will be no need for magazines.

material that's published. And we need access to lots of up-to-date material. It may be like the 1890 census—we can't go on producing this material unless it's in electronic form.

R.J.: Will printed books and magazines become rare and expensive?

G.K.: Well—I don't think people should un around right now and guster up all their old books and magazines and save them! Books are deconstive—there's nothing that book stricer than at library of old books, something you'd with the book stricer than at library of old books, something you'd want to have around. We'll look back at books like we do at all radiational things when technology passes them by. For example, sextants and compasses were instrumental in setting a passes were instrumental in setting a navigational satellites that pinpoint anavigational satellites that pinpoint about 5 position within a tenth of a mine.

However, art books may be around for a long time. We haven't yet managed to make beautiful electronic reproductions of paintings at a reasonable cost. Boundaries like this may preserve the tradition of the printed page for a long time.



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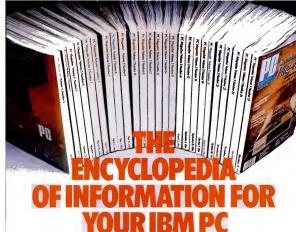
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# The Right Place At the Right Time

Silicon Valley is full of so-called visionaries and geniuses. But these labels are overblown. Most are simply bright guys who swam to the crest of the wave to ride in the tide of history.

has there ever been an industry as heavily populated with visionan-based populated with visionan-based populated with visionan-based populate industry in 1985? You can scarcely pick up a computer magazine without coming across yet another profile at time when every other computer scientific programmer, and executive is a visionary with dreams beyond the comprehension of mene mortals. No wonder half the country regards the compare business and continue of the Scientific Programmer of the Scientific Progra

I live in Silicon Valley, which, as evervone knows, has the world's greatest concentration of visionaries. I can't walk down the street without running into one. Most of the visionaries in the valley work for Apple, where, if you believe the company's PR, geniuses flourish in a renaissance of the imagination unequaled since ancient Athens. Steven Jobs and Stephen Wozniak are the company's leading visionaries, of course, but many lesser lights walk the firm's hallowed halls, including everyone who worked on the ugly box, the Macintosh. There are other visionaries around here, including Nolan Bushnell, who is the founder of Atari and who gave us one of the linchpins of contemporary American culture, the video game, I have even heard some people refer to Jack Tramiel, the man behind Commodore International and the proud new owner of Atari. as a visionary.

Visionaries are not modest people.
They think big. They plan big. They act
big. And they talk big. Jobs, a 30-year-old
college dropout, regards himself as a philosopher-king. He tends to begin his pro-

found reflections on human nature and history with a penetrating phrase: "As I look back on the development of civilization . . . . "When Jobs looks back on the de-

"When Jobs looks back on the development of civilization, what does he see? Obviously, what he wants to see.
"We're living in the wake of the petro-



Stan Augarten

chemical revolution of 100 years ago," he told Playboy. (The February issue contains an interview with him. Preposterous, brazen, egomaniacal, Jobs on Jobs is a bore.) "The petrochemical revolution gave us free energy-free mechanical energy, in this case. It changed the texture of society in most ways. This revolution, the information revolution, is a revolution of free energy as well, but of another kind: free intellectual energy. . . . This revolution will dwarf the petrochemical revolution." Ridiculous. Is oil free? Are computers free? There never was such a thing as a petrochemical revolution, and we're not in the midst of an information revolution All this is pure pseudohistory, figments of a huckster's imagination. (I'll explain at some length why we're not experiencing a genuine information revolution in a future column; there isn't enough space to go into

I'm tired of all this visionary nonsense. In the first place, most people don't know what the term really means. I don't want to be pedantic, but it's not wise to stray too far from the definition of a word-you throw ideas, and hence reality, out of kilter. Pick up any dictionary, and you'll discover that a visionary is a prophet, a dreamer, a seer, a person who sees visions-quite literally-and whose ideas and plans are impractical, idealistic, even fantastic. By this definition, is Jobs a visionary? Is Woz? Is Bushnell? Is Tramiel? Why would anyone in the computer business cultivate a reputation as a visionary? Few corporations want an impractical seer at their helms: It makes the stockholders edgy.

If Jobs, Woz, and company sent 'ivsionaries or geniuses, then what are they' Well, that's obvious. They're uncommonby bright, ambitious, hardworking, and lacky individuals who were in the right place at the right time. 'Being in the right place at the right time.' Being in the right place at the right time.' Being in the right place at the right time.' Being in the place and hackneyed phrase, I'll grant you that, but it is an essentially accurate description of what Dobs. Wor, and most of the indusance on the place of the right of the place accomplished. Let me explain what I mean.

In 1969, a now-defunct Japanese calculator manufacturer by the name of Busicom asked the Intel Corporation to develop a set of integrated circuits (ICs), or chips, for a new line of calculators. In those days, the computational functions of calculators, computers, and other electronic devices were performed by logic chips-a type of IC that can carry out only certain operations. In the jargon of electronics, these chins were hard-wired, and you needed many logic ICs to execute the basic computational requirements of a calculator. Busicom's proposed calculators would have required 12 ICs altogether: several logic chips and an assortment of ROM and RAM chips. By varying the ROM chips, Busicom intended to manufacture several different kinds of calculators, including ones with display screens and built-in

printers. Intel assigned the project to a 32-yearold engineer named Marcian E. Hoff, Jr. After studying Busicom's design, Hoff concluded that it was much too complicated to be cost effective. Fortunately, he came up with an alternative. Why not develop a general-purpose logic chip that could execute any operation? Instead of numerous logic chips, each dedicated to a specified and invariable set of operations, only one logic IC, a microprocessor, would be needed. Operations that, under Busicom's plan, would have to be carried out by several special-numose chins guided by a small memory would, under Hoff's scheme, be executed by one general-purpose chip directed by a larger memory. Busicom bought the idea, and the first microprocessor, a 4-bit chip called the 4004. rolled off the production line in 1970. However, the 4004 wasn't a very powerful computational tool, and Intel soon went to work on an 8-bit version.

At first Intel was scarcely aware of what it had wrought: the universal engine of electronics. Some Intel executives argued that the 4004 had many practical applications and that the company should sell it on the open market; others argued that the chip wasn't a significant breakthrough and that it would be a waste of time and money to try to peddle the gadget to other users. (There is a humorous story, probably apocryphal, that illustrates the many problems of technological prognostication. At an Intel meeting to discuss the 4004's fate. someone suggested that a sufficiently powerful microprocessor could run a small computer. But the idea didn't impress Andrew Grove, one of Intel's founders. Curried away by the heat of hattle, he patiled out his slide rule and stapped it on the tahe. "What the hell do! I need a personal computer for," he shouted, "when I've go one of these!") in any event, intel decided to give the 4004 a shot, and a deal was struck with Busicom, which owned the rights to the chip, allowing Intel to market it.

Not surprisingly, the 4004 sold slowly at first, but orders picked up as engineers gained a clearer understanding of the chip's near-magical electronic properties. In 1972, Intel introduced an 8-bit micro-

Carried away by the heat of battle, Grove pulled out his slide rule and slapped it on the table. "What the hell do I need a personal computer for," he shouted, "when I've got one of these!"

processor, the 8008, which was somewhat more powerful than the 4004, and, two years later, the 8-bit 8000. The 8080 was the first microprecessor powerful enough to drive a small computer, and it held direct. For several years, lated was the only microprocessor maker in the world, and its sales sourced. By the end of 1983, Index uso nee of the largest IC computers in the country, with 21,500 employees and \$11.

Were lotted in marketing men geniused? Of course not. They hardly knew which

them. Now let's look at the personal computer industry. One of the many outfits that the bought the 8000 was a small calculator and electronic hobbyist company in Albuquera, New Mexico, called Marco Instruction, and the state of the small calculators and electronic senginer of MITS). It was cowned by a former different former officer and electronic senginer named Edward Roberts. Purmeted by the price was over calculators, MITS was on the verge of bankruptcy and Roberts was casting about for a product to save it. He

decided to bet the company on a personal companer using the 508D. Designed by Roberts and two MITS engineers, the Alties 8800 was introduced in January of 1975. Roberts hoped to sell several human ded Alaira, either in kits or fully assembled. But orders poured into MITS, and, much to his sationishment, he ended up selling thousands—even though aff first the Alaira couldn't downsh more than billink its Alaira couldn't downsh more than billink its not. He, like the people at Intel, hardly knew what hit his low.

The Altair created a great deal of excitement in the electronic hobbvist community. One entrepreneurially minded young man after another tried to get into the act; for example, Bill Gates, then a bored student at Harvard, and Paul Allen, a programmer, developed a BASIC for the Altair. Gates eventually dropped out of school, and he and Allen started Microsoft. In the Bay Area, several people, including Woz, then an engineer at Hewlett-Packard, began designing their own computers. Jobs. an old friend of Woz. sensed the existence of a huge market for personal computers-so did many other people-and he persuaded Woz to go into business with him. Jobs and Woz were joined by A.C. Markkula, a former Intel marketing executive, who brought money, experience, and connections to the budding Apple. With one of the best computers on the market, Apple surged ahead of the competition and passed the billion-dol-

lar mark in 1984. Hoff and Intel, Roberts and MITS, Jobs, Woz, Markkula, and Apple-all these people and their companies have one thing in common. They made history as much as history made them. They sensed the first wave of a major social and technological tide-the proliferation of electronics and computers in everyday life-and capitalized on it. And when they succeeded beyond their dreams of avarice, when their chips and computers were snapped up by the byte-hungry millions, they were as surprised by their success as everybody else. A little smarter than their competitors, a little bolder, a little luckier, they were fortunate enough to be in the right places at the right times, and they ended up on top of the heap. But they weren't visionaries, not at all

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# High-Performance



# Alternatives to the PC AT



The articles that follow look at computers and add-ons powerful enough to compete with IBM's top-of-the-line micro. But before we scrutinize the competitors, let's examine why the AT is the standard for high-performance computing.

n the following pages, PC
Magazine looks at alternatives to the PC AT. Not just
faithful copies, but alternatives of every sort, including
plug-in boards that let your existing PC cequal or even outstrip
the AT in sheer processing
power and high-performance computers
that outdo the PC, the XT, and sometimes
even the AT.

wave of a desktop revolution. It is a multifaceted machine, full of potential and performance. While its introduction didn't completely kill the PC-XT market as predicted, it certainly defined the market for high-performance computing. It's worthwhile to dissect the PC AT to see just what the components of its attraction are.

The PC AT touched off the second

First, of course, is raw computing speed. Out of the box, the PC AT is 3.5 times faster than a standard PC. The primary increase is due to the 80286 central processing unit, which replaces the PC's older 8088. The 80286's advanced design allows it to process the same instructions several times faster, even at the same clock speed. The AT's clock runs a bit faster than the PC's, but the best news is that a \$15 crystal will take the AT from 6 MHz to 8 MHz (see sidebar by Winn L. Rosch, "Making Fast Faster"). The 30 percent gain in speed affects all the machine's operations and gives you a processing boost that you can see and feel.

Closely associated with processing speed is the PC AT's 16-bit-wide memory path. This path allows the processor to retrieve and store data two characters at a time, as opposed to the PC's single-character method. Depending on the operations, this change alone accounts for up to 10 percent of the AT's improved performance.

The second major factor in the PC AT's approach to computing is its hard disk. With a capacity of 20 megabytes, the AT doubles the storage capacity of the PC-XT. Further, the AT's hard disk has a much lower average access time. The XT's drive is typically rated at 100 milliseconds, while the AT's is rated at 40. In file-intensive use, a millisecond search is a millisecond carmed, and they rack up fast, with interest.

terest. The third component of the AT's performance is also related to the 80286—access to 16 megabyes of memory. Multi-cess to 16 megabyes of memory. Multi-cess to 16 megabyes of memory and the megabyes on a single board. VDISK, a RAMdisk program that comes with the PC AT, is the only major application for this extended memory at present, a situation that is changing rapidly. Meanwhile, use of the extended memory is not without its problems. The virtual-disk software is of the extended memory is not without its problems. The virtual-disk software is dealy of the company of the companies. The virtual-disk software is the software of the companies of the companies of the companies of the companies.

The final unique element in the PC AT equation is the 1.2-megabyte floppy disk. In retrospect, it is the one aspect of the

AT's design that must be called a failure. Sure, it's a standard—IBM backs it—but it's still a flop, it is signal and, it's still a flop, it is signal and, it's still a flop, it is that standard floppies written on the high-density drives cannot be reliably read by a normal 360K-byte drive. Pretending that of good idea, especially since 1.2-megabyte floppies are unlikely to become an enduring standard given the progress being made with 3.5 inch drives.

The ostensible reason for the 1.2-megabyte drive's introduction is to back up the hard disk with fewer floppies, a job that should be done with cartridge tape. But IBM has a longstanding allergy to cartridge tape, a resistance that hurs both its personal computer and minicomputer products, a resistance that is only now being overcome.

## The Bottom Line

Of all the reasons to buy an AT, there is only one that really matters: greater speed. The garden-variety PC AT is a faster PC-XT; nothing more, nothing less.

Spreadsheet power users buy ATs because they get their answers before lunch instead of after. When your models are so complex that an adjustment in your assumptions can take an hour to enter and many minutes to recalculate, you want all the speed you can get.

Database users need not only the capacity that the AT's hard disk affords but also the speed. The combination of fast disk and fast processing is ideal for breaking the bottleneck of sorting and indexing.

Word processing users are among the biggest speed addicts around. When the words are coming freely, the computer had better not get in the way. Creativity is too fleeting, and the sheer responsiveness of the computer and word processing software can mean the difference between success and fustration.

That's why board manufacturers have developed accelerator cands for the PC. With more than 3 million PCs out there, there is an ample market for anything that makes them go faster. The first of the accelerators, Ordin Technology's PCurbo 186, lent its name to the entire genre of turbo cards. As with the automotive equivalent, a simple bolt-on operation can easily double or even triple the performance of

the PC. They are, therefore, viable AT alternatives.

It's easy to say what the AT is, but it's more difficult to say what it is not. One thing it is not is the ideal base upon

Of all the reasons to buy an IBM PC AT, there is

only one that really matters to the power user: greater speed. The

garden-variety AT is just a faster XT; nothing

more, nothing less.

which to build a multiuser system. One the PC is its inthe key design elements of the PC is its interrupt structure. The combination of hardware and software interrupts, combined white Dowel it to object the continuation of the white Dowel it to object the continuation of the object machines of its day. Many of the odd 8-bit machines of its day. Many of the odd 8-bit in the polymer of the object to the pc. Dut its interrupt structure made its superior at overlanging time-consuming

operations such as disk access, handling the serial port, or even maintaining its own time-of-day clock.

The PC AT shares this interrupt structure, and even improves on it by language towice as many interrupt lines, the signal, twice as many interrupt lines, the signal, twice as many interrupt lines, the signal, by which peripherals let the processor know that they have a task for it. Many interrupt processes want to use the MAL controller, a device that specializes in moving data from one area of memoring complaint about high-performance computing on the PC AT is that the way DMA is used forces devices to wait for its too often.

While its hardware is a superset of the PC's, the AT still has severe limitations when it comes to computing for multiple users. Interrupts and DMA play a major role. So does memory management. The 80286 chip's chief claim to fame is its ability to address 16 megabytes of memory. It also has a new set of "protected" instructions, ones that are available to the operating system, not to individual users. This kind of architecture should make it easier to write a multiuser operating system for the AT, but it winds up being inferior to many of the memory-management schemes designed for minicomputers and multiuser microcomputers.

## Meet the Team

Tackling high-performance computers and boards required the skills and keen observations of high-performance authors.

rank J. Derfler, Jr. is an information systems manager for the U.S. Department of Defense and the author of four books on microcomputing and data communications. He has been a contributing editor of *PC Magazine* since 1982.

Affed Poor, a frequent contributor to PC Magazine, is president of solitulastries, an independent microcomputer consulting firm in Southington, Connecticut. He specializes in what he calls the dusty machine" market—belping clients get the most from their computers. The 4-year-old firm handles needs analysis, system selection, targeted training, and database configuration for many dif-

ferent kinds of microcomputers.

Charles Petzold is a programmer and

Charles Petzold is a programmer and free-lance wither. In addition to answering reader's queries as the "PC Tutor," be is a frequent Programming column author. He was formerly a personal computer coordinator for the New York Life Insurance Company, where he trained users and assisted in the development of applications.

Winn L. Rosch, PC Magazine hardware specialist and contributing editor, has reviewed a great number of high-performance add-ons. Rosch has also written several books on personal computing, as well as columns for PC Week and PC Magazine.

Similarly, the AT's hard disk, despite | its low access time, doesn't live up to its promise. Dedicated network file servers. such as 3Com's 3Server, beat the AT hands-down in performance tests. In fact, an AT on a 3Com network can transfer data to and from the server's hard disk faster than to its built-in disk. The AT's disk I/O drivers are hardly state-of-the-art, either. The ITTxtra XP, tested in this issue, makes mincemeat of the AT's disk access time-and with a slower hard disk. Sophisticated I/O drivers use techniques originally developed for much larger machines to eke out the maximum performance.

One such trick is ladder or elevator writes. In any disk-buffering scheme, there comes a time when the buffers have been modified or it's time to load a new set of sectors into the buffers. All of the modified sectors have to be written back to disk since they have been modified only in buffer memory. Elevator-writing schemes look at the sectors that need to be written. then at the current position of the disk drive's read/write head. They ignore the actual sequence of the data in the buffers and use the target tracks as a guide to the order in which information gets written to disk. Ladder-writing eliminates much of

the back-and-forth motion of the head.

There are other ways that software can tune the performance of a disk system, most of which have never been used on the PC AT. As increasing numbers of you are supercharging your ATs with 8-MHz crystals, someone should write a set of highperformance disk drivers for the AT.

Today's personal computer market is much like the automotive market of the late sixties: Speed sells. The PC AT certainly has its drawbacks, but it is the hottest thing to hit the power user's desktop in quite some time. And that's worthy of imitation, if not improvement.

## Introducing the PC Magazine Labs Benchmark Series

Benchmark test results in this and future issues tell you at a glance how personal computers and their components compare in "real life" situations.

ith the birth of PC Magazine Labs comes the introduction of the Benchmark Series. The 5 programs used to evaluate the machines presented as alternatives to the PCAT are a subset of the 13 programs that currently make up the series.

PC Magazine's approach to testing personal computers and their components is to evaluate performance and technical differences. For example when comparing disk drives, it is not enough merely to say that "Drive X is faster than Drive Y." Quantifying the difference is much more valuable to a potential buyer. This need for objective and reliable information has led us to develop the PC Magazine Labs Benchmark Se-

Most of the tests are environmental programs, which means they do not isolate the component to be tested but, rather, test it as it functions in a given system.

Since most people who purchased a PC AT bought it for its superior speed, we decided to test the integration of disk drives, RAM management, and processing speed.

Benchmark Test #1 concentrates on disk drives. It records the time needed to write a 200K-byte data file, then read the same file both randomly and sequentially. The program, written in compiled BASIC, records the exact time that the computer takes to read and write disk

Benchmark Test #2 evaluates processor speed. A simple compiled BASIC program determines the prime numbers between 1 and 50, then checks the results against a look-up table.

Benchmark Test #3 evaluates a system's performance in a program develorment environment, with attention concentrated on the processor and RAM. The DOS batch file times the execution of multiple assemblies, compilations, and links

Benchmark Test #4 is a "real world" applications test. It incorporates a selfrunning dBASE II

program that simulates day-to-day tasks. Acting as a database user, the program performs sorts. deletes and copies records, and creates indexes. It also tests the system, focusing on RAM and disk drive integration.

Benchmark Test #5 is another "real world" applications test. This program Michael O'Cone, PC Magazine's product-testing editor.

times the execution of a complicated 1-2-3 macro. It performs cell manipulations, calculations, and global copies.

As you can see, testing the system as a whole lends itself to "real life" computer use. The benchmark tests for printers pay special attention to print speed, quality, and added features, while the group of tests for languages are simple tasks used only for reference.

The PC Magazine Labs Benchmark Series allows users to compare similar components, even if the reviews are in different issues. The Series will become a standard by which a user can effectively compare the many products that exist in today's market.-Michael O'Cone



## AT&T PC 6300

With a firm commitment to becoming a major force in the industry, AT&T is aggressively marketing the 6300, a faster, cheaper version of the PC.

he AT&T PC 6300 isn't just a good alternative to both the IBM PC-XT and PC AT, and it isn't just the baseline product from a huge company that is putting a lot of effort into becoming a major force in the computer marketplace. It is also one of the few relatively successful European computers in the U.S. market.

Interestingly, this machine wears several different nameplates other than its AT&T moniker. The AT&T 6300 is made by Olivetti, which sells it as the M-24. The same machine will also be marketed by Xerox under a Xerox model number.

The AT&T 6300 is available in three models: with two disk drives and 128K bytes of RAM; a 10-megabyte hard disk and 256K bytes of RAM: or a 20-megabyte hard disk and 512K bytes of RAM. Technically, the system board of the 6300 can hold 640K bytes of RAM, but not with the RAM chip set that comes with the machine. You have to use your own 256K-bit

chips to reach the 640K-byte limit of DOS. Inside, all the models use an undated version of the 8086 processor that screams along at 8 MHz. Our benchmark tests show that for tasks involving just the CPU,

such as calculating prime numbers, this

AT&T PC 6300 AT&T Information System

I Speedwell Ave. Morristown, NJ 07960

(800) 247-1212 (201) 898-2300 List Prices: Bare CPU with dual floppy drives, \$3,975. 512K RAM, mounted 6300 Combo with 30-

Mbyte hard disk, 27-Mbyte tape backup, \$5,595; with 20-Mbyte hard disk, \$5,620 Options: AT&T Communications Manager, \$59; MS-DOS 2.11, \$395; Software Developers (programming tools), \$450; text processor, \$150; 256K

memory board, \$400; 80287 coprocessor, \$295; 10-Mbyte disk, \$1,200; mouse, \$150 Microprocessor: 80286 Clock Speed: 8 MHz

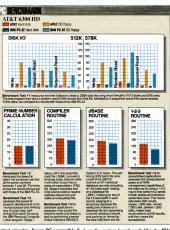
CIRCLE 682 ON READER SERVICE CARD

processor is the equal of the 6-MHz 80286 processor in the AT. However, with tasks involving both CPU power and I/O handling, the AT&T PC 6300 doesn't perform nearly as well as the AT, but it is still about twice as fast as a standard PC.

If you need expansion slots for special

cards, such as voice recognition and synthesis boards or an internal modern, the AT&T PC 6300 gives you plenty of room. In the configuration I tested, the system boards holds 512K bytes of RAM, one serial port, one parallel port, the floopy disk controller, and the RGB color/graphics





output circuitry. Seven PC-compatible 8bit I/O expansion slots are open in a floppy-disk-equipped AT&T 6300. At a minimum, the main circuit card functions save you three expansion slots companed with the same configuration in an IBM machine. The 630°s hard disk versions use one of the seven slots for the hard disk controller board, leaving six slots one.

You don't even have to use an expansion slot to install a mouse because the AT&T 6300 has an optional mouse that attaches to the keyboard. The AT&T mouse responds to software written for the Microsoft mouse, so it is compatible with most programs that can make use of a mouse. The color/graphics generation circuits

on the system board work like the IBM PC's color/graphics adapter. But AT&T also markets a display enhancement board that can produce 640- by 400-point addressable graphics in 16 colors or monochrome shades.

To someone, such as myself, who is used to examining U.S. and Japanese electronic equipment, the circuit boards in the AT&T 6300 have a rough look. Plastic insulators are rough cut instead of being polished; the components appear less uniform; the power connections are made with machine screws instead of modular plugs; and more wires are used instead of circuit board traces. None of this constitutes a complaint. I am not aware of any

pattern of failure in these machines, but if you are a connoisseur of nice-looking hardware, leave the cover on.

The keyboard of the AT&T PC 6300 is the standard PC keyboard with one very important addition: LEDs under the Caps-Lock and NumLock keys. The touch is very light, but crisp. The keys don't feel lose or mushy as they do on the keyboards of many popular PC clones.

The outside of the AT&T PC \$500 has be botton IBM frogot: a hardware reset switch. The \$500 will respond to the familiar Ctrl-41-Del Test, but if the machine is really hung up and you don't want to go drough the complete power-on diagnostics routine, you can push a recessed but on on the front panel to force a reboot. This feature is particularly useful for soft-machine the properties of the properties of

## A Good Salesman

The AT&T PC 5300 sels itself well. It is saiffiring for BIBM PC or XT, and it equals the AT's performance at some tasks. Plus, because it is supported by several big companies, you won't be left with a Chapter II ophan. The machine is aggressively marketed through retail stores across the country, selling prices areoss the country, selling prices areoss the abo has an impressive capability for expansion, so you won't find yourself playing checkers with bugs in-circuit careful.

AT&T is adding to the hardware and software it markets for the 6300. It now offers AT&T-packaged standard programs, such as dBASE, Microsoft Word, DR Draw, Multiplan, and 1-2-3 (although the PC versions will also run on the 6300) and hardware such as a 30-megabyte hard disk with tape backup. Not surprisingly, one of the first AT&T add-ons for the 6300 was the Communications Manager, which can provide simultaneous as well as separate voice and data transmission through the AT&T 6300. AT&T also markets Xenix 3.0, an enhanced version of is own UNIX III. It doesn't take much to guess that a version of AT&T's new UNIX V will hit the market soon

AT&T is in the micro market to stay. Its 6300 is an economical alternative to any machine in the IBM PC lineup.

# COMPAQ Deskpro 286

The COMPAQ Deskpro 286 is the muscle machine of the desktop set: It's built like a tank, with enough power to push past its competition.

OMPAQ seems to be firmly extremeded in the Number 2 spot in the IBM-compatible market, ableit with little hope of replacing Number 1, IBM. Like its Avis Rent-2cr cohorts, COM-PAQ reached its exalted position by trying harder than all the rest, and its efforts have paid off. So when the company tries its hand at building an AT-compatible, the Deskpro 286, you can expect two thinges a high level of compatibility and something

Right from the start, it's clear that COMPAO didn't skimp in the design of the Deskpro 286: Some sports cars have less sheet metal than this box. A steel-reinforced frame is inside the case, and an extra steel box shields the disk drives. A huge 41/2-inch cooling fan and a 4-amp power supply let you load up with memory and other goodies without fear. The floppy disk drive and the tape backup share a single controller, so after adding a display adapter and the hard disk controller, you still have five slots left. Two of the eight slots are the standard PC 8-bit bus (one is a short-card slot), but the other six are 16-bit AT bus slots.

The details on the outside of the Deskpro 286 are familiar, including the nice extras you have come to expect from COM-PAO. For example, the Key Tronic

COMPAQ Deskpre 286
COMPAQ Computer Corporation

2055 FM 149
Houston, TX 7070
(713) 370-6570
Last Priess: 256K RAM, 1,2-Mbyte disk drive, real-time clock, RGB color monitor, locks to prevent unsufforized access, \$4,999; with \$12K RAM, 39-Mbyte hard disk, and 10-Mbyte per backup, \$6,254
Options: MS-DOS 3.0, dit and swivel monitor stand, \$122,048K-byte memory board, and Technical

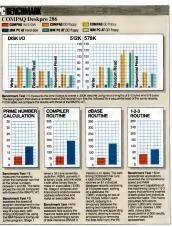
cal Reference Guide. Microprocessor: 80286 Clock Speed: 6 or 8 MHz

CIRCLE 679 ON READER SERVICE CARD

keyboard plugs into the front of the computer, an arrangement that I favor. It uses the same layout as the AT, except that the status lights that indicate CapsLock, Num-Lock, and ScrollLock modes are on the keys instead of on the top of the keyboard. The Deskpro 286 even has a lock for your hard disk, usit like the AT.

The Deskpro 286 diverges from the AT's design in several other ways, and not all of them are for the better. For instance, the power switch is located all the way in the back of the machine, an uncomfortable reach even for my longer-than-average arm. This computer is definitely a candidate for the switched powerstrip. In addition, the keyboard is a Key Tronic product, and while it is much quieter than the AT keyboard, it is also much softer and has life the the first product of the second of th





but I prefer the crisp, though noisy, IBM | module.

The monitor is a sharp, clear amber and comes in an attractive housing. Like the famous COMPAQ Portable, the display adapter can produce both an IBM monochrome-type text display and a graphics display (640 by 200 pixels in black-andwhite mode and 320 by 200 pixels with

The display exhibited one of the incompatibilities I encountered. At times, portions of the screen should have cleared but did not. The COMPAO Portable has the same problem, so it must be related to the design of the display adapters. I encountered this problem with only one or two

programs, however.

The Deskpro 286's design features are rather interesting, but none are so wonderful that they will persuade you to purchase the COMPAQ over the IBM AT. So why would you want to buy a COMPAO Deskpro 86? Performance. In this area, the COMPAQ machine pulls out all the stops and turns on the power.

As you scan the benchmark charts, you are sure to notice that the Deskpro 286 walks away from the AT in just about every category. Peter Norton's SysInfo utility rates the AT at an index of 5.9, relative to the IBM PC. The same program gives the Deskpro 286 a whopping 9.1 rating. The Deskpro was 30 percent faster on the

1-2-3 recalculation and 66 percent faster

on the dBASE benchmark. This blazing speed comes from a couple of design details. The Deskpro 286 uses a higher-performance hard disk drive than the AT. The Core International testing program rates the 20-megabyte Control Data hard disk more than a third faster in average track-to-track access (although the differences between COMPAO and AT performance are much smaller for the random test). Another factor is the clock speed on the 80286 processor. The AT runs at a conservative 6 MHz, while the Deskoro 286 times in with a 8 MHz. This 33-percent increase in speed plays an important part in the performance results. Of course, you may run into a program that balks at the high gear of the COMPAO. That's no problem; just downshift with a Ctrl-Alt keystroke and you're running at a true-blue 6 MHz.

Like the AT, the Deskpro 286 has a floppy disk drive that serves double-duty as a high-capacity 1.2-megabyte drive, which can read and write PC-standard 360K-byte disks. One cute extra is that the LED on the disk drive glows green if it is working on a 1.2-megabyte disk and red for a 360K-byte disk.

A Minicartridge Backup COMPAO went further than just giving you a winning disk drive. Its 286 machine also has an optional 10-megabyte minicartridge tape backup. It is fast, just like the rest of the machine. I backed up 1.8 megabytes of data from the root directory and four subdirectories in less than 4 minutes. and the machine spent more than half of that time verifying that it had correctly copied everything. COMPAQ claims that the machine can copy a full 10 megabytes in just 20 minutes, and my little test supports that claim, assuming that the requirements are proportional. If you have more than 10 megabytes of data to be backed up, never fear; the backup program will prompt you to insert another tape and will designate it as tape 2, much like the floppy disk BACKUP utility.

The COMPAO Deskpro 286 is the muscle machine of the desktop set: it is built like a tank but contains power to push it past the competition. It is an excellent alternative to IBM's AT.

# COMPAQ Portable 286

The top-notch craftsmen at COMPAQ have produced another winner by stuffing the AT's power into a box and putting a handle on it.

OMPAQ initially made its mark in this busines by making the portable machine that IBM failed to create. It did such a good job, in fact, that portable PC, it couldn't dislodge COM-PQ/S firm grip on the portable market a portable PQ/S firm grip on the portable market. Now that IBM has come out with the increasingly popular AT, it is not surprising that COMPAQ would enter the fray with the same winning formula.

Once again, COMPAQ has gone beyond mere imitation. It has added to and improved upon the original AT, yielding a machine that will probably be as much of a success as the first COMPAQ Portable.

As you might expect, the COMPAQ Portable 286 is tast, after all, it has the same 80206 processor as the AT. What same 80206 processor as the AT. What latest than the AT.—generally 30 to 65 percent faster in the benchmark tests. Peter shorton's Syslind utility program rates the machine at an index of \$11, relative to the machine at an index of \$11, relative to the machine at an index of \$15 per short and \$15 is speed is partly use to the fact that the 80206 runs at 8 MHz rather than the 6 MHz of the IBM machine. If your software balks at the higher clock speed, you can use the CUT-AI combination to shift it

The one part of the Portable 286 that is not on a par with the AT is its hard disk. It comes with a Miniscribe 3½-inch hard



disk, amply isolated with shock mounts similar to the hard disk in the COMPAQ Plus. It is only half as fast as the AT's high-

Once again, COMPAQ has gone beyond mere imitation. It has added to and improved upon the original AT.

performance drive to which I've grown accustomed, although it is not as slow as many PC add-on hard disks. In spite of this handicap, however, the COMPAQ Portable 286 outperforms the AT.

The machine's housing is the traditional COMPAQ case, with the familiar green screen that handles both monochrorre text and graphies with ease. Right off the bat, though, you notice that the space in which though, you notice that the space in which though you have long or reside now contains a half-height floppy and a half-height tage drive. The LED on the floppy drive flashes red or green depending on the density of the disk it is readine; 1.2 -neces-

byte floppies make it turn green, while

standard 360K-byte disks show red.

## A Soft Touch

The power switch is in the same familiar location, but the power supply is clearly larger. The keyboard is a Key Tronic imi-

COMPAQ Portable 286 COMPAQ Computer Corporation 20555 FM 149 Houston, TX 77070

(713) 370-0670 List Prices: 256K RAM, 1.2-Mbyte floppy drive, real-time clock, 9-inch green monochrome dualmode monitor, locks in operating and nonoperating mode, \$4,499; with 20-Mbyte hard disk, \$6,299 Microprocessor: 80286

Clock Speed: 6 or 8 MHz
CROLE 678 ON READER SERVICE CARD

tation of the IBM AT layout, except the indicator lights are right on the Caps Lock, Num Lock, and Scroll Lock keys instead of on a separate panel on top of the keyboard. I noticed that the Portable's keyboard is apparently not the same as the Deskpro 286, as it has a somewhat different feel. It is quiet but does have some tactile feedback, making it much more comfortable to work on than the deskton version. By the way, the only quality-control problem I found in the Portable 286 was in the keyboard: It had been mounted off-center within its case, so that the keys on the left edge of each section would bind. A little reassembly with a Phillipshead screwdriver quickly fixed the prob-

# COMPAQ has pushed the definition of "portable" to

new heights—or rather weights. Even the most

stripped-down

configuration weighs in at just over 30 pounds.

## lem with little fuss.

Making other repairs to the Portable 286 may not be as easy, unless you are willing to expand your tool collection.

Like its portable predecessor, this computer is housed in a sturdy box of aluminum panels. But, in this new, high-performance version, the panels are mounted with the new high-torque, star-headed bolts, making access to the inside difficult for the casual observer.

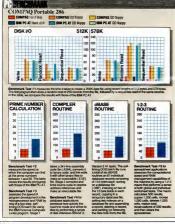
The only knob next to the screen is a brightness control, just like the one on the original COMPAQ Portable. I miss the contrast adjustment found on most other monochrome screens. The screen also has the only IBM incompatibility that I encountered in the entire benchmark testing: It failed to clear portions of the screen properly for some of the programs I used. I have encountered this particular problem while running a very few programs on my old COMPAQ Portable as well; COM-PAO clearly does something slightly different from IBM to control its screens. It is not a major problem, however, because it does not appear to happen with any of the mainstream software products that I have used on either machine.

## A Portly Portable

The folks at COMPAQ have pushed the definition of "pottable" to new, extended heights—or should I say "weights." Even the most stripped-down configuration which has neither a hard disk nor a tape drive, weights in at just over 30 pounds. You had better make an appointment with your local gymnasium and pump up your bicceps if you plan to bring this powerful but betry machine on your next monthlone business trin.

When I first saw this heavy-duty computer, I though that carrying an AT around in a box was a little ostentations. After all, in: 'the COMPAQ Plus sufficients', or deeper reflection, however, I remembered the days not too long ago when I thought two floppies in a portable were enough and that hard disks were excessive. My expectations continue to rise rapidly, and I'm sure that AT performance and memory will soon be accepted as the norm for portable computers.

If you want a "faster-than-AT" highperformance machine and you have to move it from office to home and back again, then look no further than the Portable 286. COMPAQ has produced a winner



# Gulfstream Professional Computer 88

Targeted exclusively to value-added resellers rather than to end users, the Gulfstream Professional Computer 88 offers a variety of configurations and room to grow.

he Gulfstream Professional Computer 88 uses an 8088 microprocessor that runs at 4.77 MHz, the same as the IBM PC and XT, but it surpasses those computers in three ways: It allows 640K bytes of RAM on the system board, it is available with hard disk drives in 10-, 20-, and 30-megabyte capacities, and it can be purchased with a built-in 10- or 60- megabyte tape backup system.

The Gulfstream PC/88 is targeted at value-added resellers (VARs) who need to purchase quantities of XT-like machines at non-IBM prices. In fact, Gulfstream offers very attractive dealer pricing and bulk discounts for this purpose. If you need to install a number of PCs or PC compatibles. you should definitely consider the Gulfstream PC/88.

As an average consumer, you may not be able to buy a Gulfstream at your local computer store, but you may someday find one on your desk at work. Don't worry that the label says Gulfstream instead of IBM. Stand back far enough and it looks almost like a PC. What's really nice, though, is

ram Micro Syst 5500 N. Federal Highway

Boca Raton, FL 33431

(305) 994-6500 List Prices: 256K RAM (expandable to 640K), one floppy drive, floppy disk controller, Key Tronic 5151 keyboard, one parallel and two serial ports, external reset button, 135-watt power, \$1,895; with two floppy drives, \$2,195; with one floppy drive and 10-Mbyte hard disk, \$3,320; with 20-Mbyte hard disk.

\$3,720; with 30-Mbyte hard disk, \$4,320; with 10-Mbyte hard disk plus 10-Mbyte tape backup, \$4,288; with 20-Mbyte hard disk plus 60-Mbyte tape backup, \$5,684; with 30-Mbyte hard disk plus 60-Mbyte tape backup, \$6,284 Options: GW BASIC

Microprocessor: 8088

Clock Speed: 4.77 MHz CIRCLE 681 ON READER SERVICE CARD

(Note: Gulfstream can custom-configure any base model. The company usually sells to resellers and esn't bundle software.)

leaving plenty of empty slots while virtually eliminating the need for costly expansion. doing a DIR on drive C: and finding that you have 30 megabytes of available disk space. A number of features makes the PC/88 well suited for a corporate environment or for applications that require multiple exof costly expansion. pansion boards. The Faraday system board on the Gulfstream PC/88 can accommodate 640K bytes of memory in two banks of 256K-bit chips and two banks of 64Kbit chips. (Alternatively, a jumper on the system board allows putting 64K-bit chips

in all four banks for a total of 256K bits.)

When corporations install PC-XTs, they invariably find 6 months later that they have to start upgrading them with memory expansion boards. The Gulfstream PC/88 virtually eliminates the need for this type

The system board also includes two parallel printer ports and one serial port. The connectors for these ports are mounted on the back chassis, eliminating the need for a multifunction board, as well,

The crowded system board also contains a floppy disk controller that can sup-



port up to four drives. The Interdyne tape backup system is run by this same controller. This tape system is a big plus for corporate users. One problem with XTs and ATs installed in corporate offices is that nobody is concerned about backing up hard disks until one of them crashes.

On the machine PC Magazine tested (which include a 30-megabyte hard disk, a 60-megabyte tape backup, and 640k bytes of RAM), one expansion slot was filled by a Persyst monochrome display board and another by the hard disk controller. This was essentially a complete system, packed with more goodies than most systems I've seen. It has all the RAM it can take, a hard disk, a floppy disk, a tape.

backup, parallel ports for two printers, and a serial port for a modern or plotter or whatever else. Yet the system unit looks empty. An unbelievable four long slots and two short closs are available for other purposes. What can you put in those islot? If you don't know yet, you'll soon find out. Just rest assured that you can flex a considerable amount of PC muscle and still not but up against the system walls or have to start pricing expansion boxes.

## A Key Problem

The rest of the system consists of standard add-ons, making the machine seem like something you might put together yourself. Gulfstream includes the Key Tronic KB 5151 keyboard. Preference in keyboards is perhaps more personal than any other part of a personal computer system. If you, like me, think that the design and feel of the IBM keyboard is supreme, you won't be thrilled with the Key Tronic model. It is organized more like a traditional typewriter than the IBM keyboard is. The backslash key is to the left of the upper Shift key. The function keys are lined up across the top with smaller Ctrl and Alt keys placed at the extreme left. Since the function keys are often used in conjunction with Shift, Ctrl, and Alt, the IBM keyboard lets you trigger all combinations with one hand. The Key Tronic does not. The separation of the cursor keys and number pad is probably the only real

Gulfstream offers a variety of monochrome and color adapters and displays for installation in the 88 model, depending on the application the machines are intended for. The test unit included a Quadram Amberchrome monitor in addition to the Persyst monochrome display card. This excellent monitor almost convinced me that amber is susrept to green.

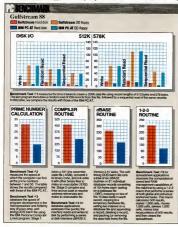
advantage of the Key Tronic layout.

If you ever have to replace the monochrome display with a color model, you will have to get at a DIP switch, which is located undemeath the floppy disk drive, which itself is undemeath the tape backup system. You'd better decide what type of display you want at the beginning and let Gulfstream configure the machine for you.

## A Minimal Manual I found no apparent compatibility prob-

lems in running software or DOS on the Gulfstream PC/88—the machine runs standard DOS 2.0 or above without a hitch. The documentation that Gulfstream provides is only a technical outline of the system board and whatever comes with the display adapter, display, and tape drive. A VAR would normally add this material to more-complete documentation prepared for the specific application of the machine.

The Gulfstream Professional Computer 88 is an attractive alternative to IBM and is particularly suited for applications that require its special configuration options. But anyone who could make good use of the attractively empty slots in the system unit should take a look as well.



# Gulfstream Professional Computer 286

The Gulfstream Professional Computer 286 isn't a true AT-compatible, but its speed, power, and high storage rival the XT.

n its maximum configuration, the Gulfstream Professional Computer 286 contains an 80286 microprocessor running at 8 MHz, a 30-megabyte hard disk, a floppy disk drive, and a built-in 60-megabyte tape backup system. Despite its 80286 chip, however, this machine is really a highstorage and high-performance alternative to an XT. not a true AT-compatible.

Like the Gulfstream Professional Computer 88, the PC286 will be distributed by value-added resellers (VARs) involved in quantity corporate sales. For most memory-bound operations, the Gulfstream PC286 is significantly faster than an IGM AT: However, it is not strictly AT compatible and cannot accept AT-style 16-bit texpansion boards or extended memory. Disk access time is usually somewhat slower than an AT.

The system-unit styling is almost idention to the IBM PC and XT. However, a nice addition to the PC/286 is a built-in tape backup system right above the halfheight floppy drive. Tape backup is almost a necessity in business environments and putting it right in the system unit is a wise move.

## Gulfstream Professional Computer 286

Gulfstream Professional Computer 286 Gulfstream Micro Systems

5500 N. Federal Highway

Boca Raton, FL 33431 (305) 994-6500

(Sub) 1944-0000 Late Prisess: 250K RAM (expandable to 640K), one floopy disve, floopy disk controller, external rest to botton, key Froncis 515 keybood, 1555-aut power. St. 2599; with two fleopy driver, 53.255; with two fleopy driver, 53.255; with conditions of the floor floo

Options: GW BASIC Microprocessor: 80286 Clock Speed: 8 MHz

CIRCLE 680 ON READER SERVICE CARD



The PC/286 is available with either 10.

Jo, or 30-megabyte hard disk capacity.
Tape backup units are available in 10- or
60-megabyte capacity. Our test unit had a
20-megabyte taped disk drive and a 60-megabyte tape drive. Like the PC/88, the
PC/286 has no software compatibility problems; it runs standard DOS, a good sign that the machine will run other PC
programs as well—and it does.

It's important to realize what this system is and what it is not. First, the microprocessor is an 80286, running at 8 MHz with no wait states, whereas an AT with the same chip runs at 6 MHz. For many operations involving just memory access, the Gulfstream PC/286 will be faster than an AT.

The Gulfstream PC/286 is not strictly an AT-compatible. The expansion slots accept only the PC- and XT-style expansion boards with the 8-bit data bus, not the newer AT boards with the 16-bit data bus. You cannot put an extended memory board into this machine.

The floops discussed is half-height dosblo-density divin that cannot write to or read the 96-tracks-per-inch high-density. 12-megabyte disk format that the AT disk drives can handle. However, this halfheight floppy drive is surprisingly quiet and, in operation, sounds like a 12-megabyte disk. Under DOS 3.r., 360K-byte floppy drives usually sound like a garbage disposal doing battle with a steak bone.

For benchmark tests that do not involve disk access (such as the 1-2-3 spreadsheet

Gulfstream Hard disk Gulfstream DD floory

Gulfstream 286

test), the Gulfstream PC/286 is about 40 percent faster than the AT. The Peter Norton SYSINPO utility program measured 9.1 for the Gulfstream PC/286, compared with 5.9 for the AT.

with 39 for the A1.
However, even with this higher conputing speed, the PC/286's Rippy disk and hard disk access times are slower than the AT's, and they, in turn, affected the disk (D, compilation, and dBASE II benchmarks. In some cases, the differences are not very significant. The Core International hard disk performance test showed that the Gulfstream PC/286 is just marginally slower than the AT and that it meets the IBM specifications for an AT hard disk Your applications needs should determine whether this machine is worth your attention. For spreadsheet calculations and screen-flipping through word processing documents, the PCZ86 performs better than the AT. I had never seen instantanous screen updates in WordZuer on a PCcompatible before using this machine. For disk-based applications, it's not quite as fast. Expansion with normal boards is limted and extended memory is impossible.

Under the maximum Gulfstream configuration, the system-unit insides are crowded. Unlike in the Gulfstream Professional Computer 88, the floppy drive controller and the tape drive controller are not included on the PC/286 system board; both controllers as well as the hard disk controller require an expansion slot.

er require all explaisation sor.

And unlike the Guillstream PC/88 model, which has circuitly for two parallel
ports and one serial port right on the systeme take PC/28 systems on the
port of the port
mount parallel or serial ports on expansion
boards. The configuration I looked at
comes with a parallel port on the Persyst
monochrome video board and another on
the tape drive controller. But adding a serial
port in a short stot leaves only one short
sets and two lones solve free.

The Gulfstream Professional Computer 286 keyboard is the Key Tronic KB 5151, the same one used with the PC/88 model. Your own preferences will determine whether it is a good keyboard for you, but I don't like it.

## IBM PC AT Hard disk IBM PC AT DD floppy DISK I/O 512K | 578K 140 140 120 120 100 record lengths of 512 bytes and 578 byter PRIME NUMBER COMPILER dRASE 1-2-3 CALCULATION ROUTINE ROUTINE ROUTINE 525 350 280 30 450 200 240 375 200 200 225 120

## Wasted Power

While I like the memory-access performance of the Gulfsream PC/28. I think the 80286 chip is wasted in this system because it cannot accept AT boards or tended memory. And the Gulfstream PC/286 lacks my favortic feature of the PC/88: the availability of four long and two short expansion slots under a maximum configuration.

As of this writing, Gulfstream is planning to introduce an ATC-286 model, which will be a true AT-compatible. Gulfstream has demonstrated that it can put together good machines for the VAR market, so I'm hopeful that the ATC-286 will excell in the areas where the PC/286 doesn't quite measure up.

## ITTxtra XP

A cache memory utility, borrowed from the mainframe computer industry, makes the XT-compatible ITTxtra XP 30 percent faster than the AT.

would rather have an ITTATE AP
on my desk than an IBM PCAT
This powerful machine is a logical
evolution of the 808 PC architecture, which is operationally superior
to the AT in sevent ways, and it costs less.
First, the ITTATE AP is a 21 inches
wide and 17 inches deep, and its box dominates a desk. The TTATE AP is 21 inches
wide and 15 inches deep—ris keyboard is wider than the computer.

The ITTxtra XP's PC compatibility is another point in its favor: it doesn't have any of the software compatibility quirks of the AT. The ITTxtra XP normally runs at the AT's speed of 6 MHz, but with two keystrokes you can select 4,77 MHz, the PC's operational mode. PC compatibility is important to me because of the investment I have in software for the standard PC. I want my PC software to run the same way it always did, except faster and, perhaps, under a multitasking environment. The ITTxtra XP's serial and parallel I/O connectors are industry standard DB-25, just like those used on the PC. With an ITTxtra XP, I don't have to worry about special AT cables or adapters.

When it comes to performance, the only thing the ITTxtra XP lacks is the AT's high-density floppy disk drive. In all of our benchmarks, it matched the AT in processor speed and surpassed all the machines in the area of performing operations using a lot of disk actions.

Finally, I like the machine because of the design of its system board, which carnies 640K bytes of 16-bit wide RAM, using 256K-bit chips instead of the piggyback chips totaling 512K bits in the AT design. The ITTxtra XP system board includes a serial and parallel port along with the disk controllers for both the hard disk.

and floppy drive. A dedicated memory card can hold up to 2 megabytes of 16-bit wide RAM. After you configure an ITTXtra XP for normal operation with a video card, 1/0 ports, a floppy drive, and a hard drive, you still have four PC (not AT)

compatible slots open for expansion.
ITT does not market the ITTxtra XP as
an AT-compatible machine. The machine
has no AT expansion slot, no 1.2-megabyte disk drive, and no hard-disk lock. It



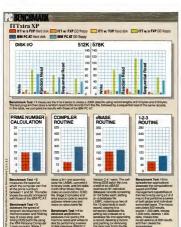
## ITTxtra XP ITT ISD Customer Inqui

2350 Qume Drive San Jose, CA 95131 (408) 945-8950

List Prices: 512K RAM, one floppy drive, 10-Mbyte hard disk, one serial and one parallel port, ITT version of MS-DOS (including cache memory program), \$3,995; with 20-Mbyte hard disk, \$4,595 Options: 120K expansion kii, \$135; 512K kii, \$295; 1-Mbyte kii, \$395

Microprocessor: 80286 Clock Speed: 6 MHz

CIRCLE 677 ON READER SERVICE CARD



does have an 80286 processor and everything you need for high-powered computing, and its fully configured price is nearly \$2,000 less than that of the AT.

The HTXtra XP keyboard incorporates standard IBM PC layout with LEDs added under the NumLock and CapsLock keys and ridges on the F and J keys. It has a crisp feel that is only slightly softer than the PC's. Also, ITT did not correct any of the PC keyboard's problems, such as the anemic size of the Return key.

## A Software Edge Although the 10-megabyte ITT hard-

disk system has the same Qume drive (Qume is a part of ITT) used by IBM in the older PC-XT, the ITT machine logs hard disk performance times 30 percent faster than that of IBM's AT. ITT pulls off this feat with software. The company bor-

In performance, the only thing the ITTxtra XP lacks is the AT's high-density

floppy disk drive.

rowed some techniques from the mainframe computer industry and gave the ITTxtra XP the ability to use cache memory management. Cache memory utility

programs use RAM above the 640K-byte workspace to hold blocks of data that frequently move into and out of the disks. These programs have routines that analyze the use of the disk and determine what blocks of data to hold.

DOCKS of data to POIG.

Though the drive mechanism used by ITT int Physically a fast as the AT drive, the cache utility (FXP) makes the operational speed of the ITTATA XP faster than ATT. The caches forware even makes the PC-standard floppy disk drive on the TIT look as fast as and Thard disk in some tests. The real effect of the cache utility program deepends on many factors, such as how often the same data is read and what addicent data on the disk is used.

adjacent data on the disk is used.

A cache utility running on the AT would probably not allow it to move dum under faster than the ITTAX Punless the cache program itself was faster. The limiting factor in the ITT system is the movement of data in and out of RAM buffers. Also, cache utility programs can have problems reading the coding on some copy-protected disks.

ITI, or any other company with a good cache system, can use a slover, probly more trouble-free, and certainly lesses-pensive drive mechanism than the one in the AT and get equal or better performance on the average. ITI publishes a list of DOS programs that run on the ITI trax XP, overing all of the programs that size in the covering all of the programs that the content of the Compatibility. The ITI TOAL OF CONTENT OF THE CONTENT OF THE

Any PC video card will work with the ITTART XP, but ITT makes a separate video card with a wide range of options, including monochrome graphics on the PC monochrome monitor and 640- by 200pixel resolution in 16 colors on an ROB monitor. The ITT card can emulate the IBM, Plantronics, or Hercules video systems. ITT also markets a very powerful voice recognition and synthesis system with its own microroroccssor and RAM.

The ITTxtra XP is a nicely sized and priced machine with power to chew through last year's and next year's software. This powerful machine is much more than an alternative to the PC AT. In many ways, it is even better.

# Kaypro 286i

Kaypro, a long-time leader in the CP/M market, enters the IBM world with a new high-performance desktop that just might outdistance the AT.

ayro made is name in the microcomputer business with a luggable two-drive CP-M machine. The companion world white COMPAQ connered the PC-compatible luggable market. Now Kaypro is making its presence known with an AT-compatible machine called the 286i. But don't look for a handle: This Kaypro is a desictor with a spranter display.

The steel construction is recognizably Kaypro with a dark-green (almost black), painted finish. The keyboard layout and toggle lights, the power-on and hard disk lights, and the keyboard switch lock all correspond to the PC AT but are integrated into the Kaypro syling. The Kaypro 286 is available in four models with various drive configurations. We tested the Model C, which is equivalent to an enhanced PC AT.

The Kaypro 286i is an AT clone in the very best sense of the word: You will experience few if any problems running IBM PC software or using AT-compatible expansion boards. The BIOS is from Procents Software, and the machine runs standard PC-DOS 3.x without any discernible hitches. Any machine that cannot run PC-DOS and requires its own special version of MS-DOS is not completely PC-compatible. Applications software such as Lo-

DE ELECTRIC

Kaypro 286i Kaypro Corporation 533 Stevens Ave. Solana Beach, CA 92075

(619) 481-4300 List Prices: 512K RAM, 1.2-Mbyte floppy drive, \$2,995; with two 1.2-Mbyte floppy drives, Word-Star, and MailMerge, \$4,550, 512K RAM, 20-

Mbyte hard disk, one high-density floppy, \$4,795; with 20-Mbyte tape backup, \$5,995 Options: Color adapter and display, \$650

Microprocessor: 80286 Clock Speed: 6 MHz CROLE 683 ON READER SERVICE CARD tus's 1-2-3 and Microsoft's Flight Simulator also run smoothly on the Kaypro 286i. Aside from the WordStar and Mailmerge programs that are bundled with the Model B, the only software supplied with the 286i is a GWBASIC disk and an AT-like SET-UP program.

UP program.

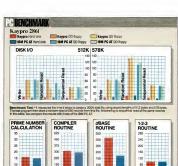
The separately available Kaypro color monitor is also IBM compatible. However, the screen background of the monitor is

not as black as IBM's, and the colors are not quite as vibrant.

not quite as vibrant. The 286i's expansion slots will accept

any boards that the AT will take. One board that should prove unnecessary, however, is a 640K-byte memory expansion board. 512K is standard on the system board for all four 286i models, but you can populate two additional banks of 64K-bit chip sockets on the system board.





Since the Kaypro 286i is AT compatible, you can install up to 15 megabytes of extended memory and patiently wait while the software manufacturers catch up with your new hardware capability. I tried out a Qubie Basic Time AT 4×4 Plus extendedmemory board equipped with 4 megabytes of 256K-bit chips, and it worked just fine. I was able to use the DOS 3.1 VDISK.SYS driver to install four 1-megabyte RAMdisks, and while I couldn't think of an application for this configuration offhand, I was impressed by the simplicity of the setup.

75

18kes a 341-i

binary code, and link-edits

enchmerk Test #2 sasures the speed at sich the computer can find

nark Test #3 gram development in the reprocessor and RAM b

the results compared see of the IBM PC AT

Most of the benchmark tests involving memory access and floppy disk access rated the Kaypro about the same as the AT, and Norton's subjective SysInfo processing-speed test awarded the Kaypro a 6.3 as

Benchmark Test #5 for

spreadsheet applications assesses the computational speed and RAM

speed and RAM management capabilities of the macrine by using a 7-2-3 macro that performs a series of both global and individual worksheet tasks. The macro calculates 500 results, copies 1,000 cells, moves 1,000 cells, moves 1,000 cells, moves

cells, deletes 1,000

Version 2.41 tasks. The self-

tening DOS batch file run a total of six dBASE routines on 81 individual

( DBF), indexing on two of the 13 data fields in each

opposed to 5.9 for the standard-issue AT. Hard disk performance on the Kaypro was in many cases significantly better than the AT. The Core International hard disk test concluded, "This is the ultimate in hard disk performance. It exceeds all IBM specifications by more than 30 percent for the PC AT." In fact, the access times reported by the Core International test were so much better than the AT's-ranging from 5 to 10 times faster-that I had difficulty believing their validity.

In real-life applications you will get better hard disk access times on this machine than the AT, but only about 10 percent bet-

ter, not 500 percent to 1,000 percent better. Regardless, Kaypro might want to investigate the possibility of including the Core International disk test program on the disk supplied with the 286i. A message that assures the "ultimate in hard disk performance" makes engineers and consumers very happy.

During one of the benchmark tests, I accidently banged my chair into the desk and the Kaypro 286i rebooted. Hmmm, I thought, does this qualify as a "hardware reset"? It certainly does, but only if you can reproduce it, I later learned. I tried the chair trick again, then slapped the system unit directly from several angles, much like I thought a harried executive might while attempting to debug a 1-2-3 macro. But the "bang boot" remained an unreproducible phenomenon.

No computer is problem-free, but the Kaypro's drawbacks are ones you can probably live with. The keyboard has a very light, mushy touch and a speaker that chirps softly in response to each keystroke. If the chirps were any softer, you wouldn't be able to hear them at all: any louder, and you could get used to them. But the volume is right at the threshold of audibility that I find very annoying. The keyboard is encased in a steel box comfortably deeper than the AT keyboard so you can rest your hands on the bottom edge.

The manual for the Kaypro is skimpy, just 33 pages of set-up information, a discussion of the keyboard and diskettes, and some rudimentary technical information. However, the Kaypro 286i's high degree of AT compatibility provides a solution to this problem. Since purchasers of the Kaypro 286i will have to buy DOS 3.x. they should also be sure to pick up an AT Guide to Operations manual or Technical Reference manual for some additional information. Although some of the details will be different, the machine seems to be internally close enough to a PC AT for these books to be of value.

Other than these minor gripes, the Kaypro 286i is a fine machine. Kaypro fans still using their CP/M luggables might want to take the step into the 16-bit world with this unit; others in the market for an AT-like computer will want to consider this quality machine from a company with a fine reputation.

## Low power omplete hard disk kit \$395

Comes complete with virtually the identical controller that's in the BM®XT and Xerox® warranties the hard disk for one year

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Instead, we put the extra profit into our testing facilities. That's why Xerox guarantees our

\$395 10 megabyte hard disk for Xerox knows, as our customers know, that we have an extensive testing program. Here is what we contribute toward giv-

## ing you the maximum hard disk Best Drives Available

First, we buy the best drives available. Sounds trite, doesn't it? 1 mean, a drive's a drive right? Hardly. You should see some of the junk we get in our labs. Some have such high failure rates that we even ques-tioned our own \$10,000 hard disk tester. But when we tested other manufacturers drives we were assured that our equipment was fine, which just confirmed that the bad hard disks were not only

bad-they were real bad. But that's just the weeding out process. We then take each drive that we've put through our tester and test it again with the control-ler you've requested. We call this

## DOS Doesn't Do It

tion of what DOS does for you, let me explain the disk facts of

If DOS did what you may think it is supposed to do when you format the disk, DOS would p around these bad areas. Unfortunately, DOS doesn't do

DOS 2.0 and 2.1 can't enter the bad tracks. DOS 3.0 can, but only on the IBM AT. Unfortunately, as the press has so well documentated, the AT's hard disk develops bad tracks later

## We do what DOS can't We believe the problem is so

bad, we use a software program that performs a powerful test of your disk drive on all of the IBM or IBM compatible computers— PCs, XTs, and ATs, Our format takes hours to analyze the disk. But when we finish, you know that the bad tracks are really mapped out so you won't write good data that will disappear into a black hole. We even send you a printed statement of our

Our software allows you to type in the bad track locations from the list supplied by the manufacturers, so you'll never write good data to them—even if DOS didn't identify them as bad. The software even lets you save the location of these bad sections to a file, so that you can In case you're thinking that all spending hours retesting.

We even include a program that will give you continuous comments on the status of your hard disk. No more waiting for that catastrophic failure

## Average Access Time

As you might suspect, some hard disks are faster than others in their ability to move from one track of data to another. The time it takes the hard disk to move one-half way between the beginning of the disk to the end is called the "average access

The first generation of 10 meg-abyte bard disks had average access times of 80-85 milliseconds (msec). But computer users love speed, and guess what—the average access time for the new 20 megabyte hard disk in the 1BM AT is only 40 msec. (We sell an AT equivalent with only 30 msec

access time!) There are some legitimate rea-sons for the shorter access time. It's particularly helpful when there are multiple users on the same hard disk. It's also imporsame hard disk. It's also impor-tant when running a compiler. But remember, before you get too wrapped up in the access speed, there's always that ST 506 interface which won't let data transfer from the hard disk to the computer any faster than 5 me-gabits/second. We've bypassed that choke hole, too. If you want the functional equivalent of a Ferrari with a turbocharger, order our 10 Mbit per second 100 megabyte hard disk with 18 msec of average access speed.

100 percent compatible with the IBM XT you don't need to buy the same hard disk that's in the XT. You can't even be sure what brand hard disk it is because IBM, like Express Systems, goes into the marketplace and buys hard disks from several vende However, they buy their XT hard disk controller from only one vendor-the same one we

You can buy the IBM XT con

troller from IBM for \$495 or you can buy from us, the functional equivalent, manufactured by the same company that makes it for IBM for only \$195. Is it the ex-actly identical IBM XT controller? No, it's better. First, it takes less power, and secondly, it can control from 5 to 32 megabytes-the IBM controller can work with only 10 mcgabytes. It is 100 percent 1BM XT compati-ble, and 100 percent is 100 per-cent. If you want to save a slot, we carry a version that lets you operate two hard disks and two

## floppy disk drives More than 32 Megabytes

You can operate with more than 32 megabytes (the limit of DOS) through the use of "device driv-ers." Express Systems can supply you with device drivers for our individual files, or databases that are large, you might want to concan divide our 65 megabyate (formatted) hard disk into two equal volumes of 32 megabytes each. sider one of our controllers that

## Reliability

We offer you a choice between iron oxide and plated media— the stuff that covers the hard the stuft that covers the hard disk and gives it its magnetic properties. Iron oxide is,—well, it's rust. If you inadvertently joust your disk, you may cause the low flying head to dig out some iron oxide. A little rust flake can ruin your whole day. Plated media is more resistant to damage, and if it happens, less data is lost.

We offer both types of hard disks. The iron oxide is older







technology, and quite frankly, manufacturers understand it bet-Their better understanding, combined with some of the special head locking mechanisms. gives us peace of mind when we

## Power

Hard disks consume power. Our small, half-high hard disks cone so little power that you c use them with your existing IBM PC power supply. If you plan to use lots of slots, you'll want to increase your power supply to be safe. We offer the same amount of power for your PC that comes in the XT

## Our Customers

fortable buying mail order. They forget that Sears began as a mail order house or that IBM is now nto mail order. But, if it helps, here is a partial list of customers who have felt comfortable to buy

American Express Honeywell U.S. Army AT&T (Bell Labs) Bausch & Lomb Lockh

Sperry

## Easy to Install

If you're like most of us, raised on the boob tube rather than the Great Books, you'd rather see e movie than read the book. Well, now you can choose to read our installation manual or for only \$9.95 more, you can get a VHS or Beta video cassette showing the simple steps for in-



Our VHS or Beta Cassettes make

## Warranty

We offer you a one year war-ranty on our hard disks—the same as IBM on the AT and 90 days on the tape drives. (It's all manufacturer gives us.) If





Formatted MB	Height	Plated Media
10	59	no
10	V2	yes
21	3/2	yes
21	Full	100
32	V2	yes
32	Full	no
65	Full	no
100	Full	yes
Remov	able Hard	Disk
10	1/2	no

Tape Systems and Subsystems







N/A N/A 595







anything goes wrong with your

tape or disk drive or hard disk, send it back in the box it came in

However, we have found that we

can usually solve the problem over the phone. So call first for a

return authorization number be-

cause we can't accent any returns

Comes complete

All Express Systems products

come complete with the appropriate software, tape and/or hard

disk controllers, and cables

where required. Hard disks are formatted and tested with the PC

DOS of your choice. All drive sizes are formatted capacities.

If your application requires a stacking kit, power splitter ca-bles, daisy chain cable, or some other variation, we'll supply

se items at a nominal charge We even ship our hard disks with Command Assist TM an on- line

DOS-like manual to give you

help with your DOS commands.

without it.

All of our hard disk and tape controllers are available separately: Please call for prices Subsystem Chassis Any of our disk or tape units are available in an external subsystem for an additional \$250.00. You can mix & match any of our 1/2 high hard disks or tape drives together or

add any single full height hard disk Tape Cartridges xpress Certified 555 foot 310 Hei 1/2-inch Data Cartridge

Power Supply

\$35.00 \$125.00

*with the purchase of any drive

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suring that our disks will arrive in working order, we have a customer service department that, unlike many of our competitors has little to do. When you need us, you won't get a constant busy

Call our friendly, knowledgable customer service staff to get answers to your questions—be-fore or after the sale. Our people, who know the PC, can talk you through the sticky parts, and they'll respond to you quickly.

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money order (We'll take a check, but you'll have to wait for it to clear) and tell us if you want one of our recommended configurations or you want to mix and match yourself. Corporations with a DUNS number may send purchase orders for quantities



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Second, Sony Trinitron's exclusive Super Fine Pitch" Aperture Grille. It dramatically increases the number of red, green and

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# INESS PICTURE HAS ED BRIGHTER.





# Pushing Your PC Past the



# Speed Limit



If you feel as though your personal computer is stuck in the slow lane, you don't have to chuck the entire system. An accelerator board could be what you need to obtain processing speeds so high they should be illegal.

If your PC seems painfully slow, the one surefire way to speed up your system is to check the whole thing and to the whole thing and to more powerful one. If, however, getting the most performance for foremost purchasing criterion, you can enhance the performance of the computer outliness of the computer of the compu

salely 4.77 Milk.
Unformately, you can't just pail the
high back native microprocesses deplication of the paint of the paint of the paint of the
high back native microprograms of the
next and play in secretain pele. The
had your system is certain to suffer transplant rejection and never run- one
crawl—again. To operate properly and
feel at home with the rest of a computer
system, every microprocessor requires its
own favored environment, including both
software and a cluster of special support
chips.

À turbo or accelerator board is an expansion card for your PC that embodies all three elements required for a successful computer brain transplant: a more powerful microprocessor, the necessary support chips, and the software required to retain PC compatibility in spite of the intrusion of alien hardware.

Not all turbo boards are created equal,

however, and they can differ in several ways. Perhaps the primary distinguishing characteristic among different turbo boards is the microprocessor that each board hosts. For true IBM compatibility, all the likely candidates for enhancing your PC use one of three members of the Intel 8088 family: the 8086, the full 16-bit sibling of the 8-bit external, 16-bit internally structured 8088; the 80186, a full 16-bit chip similar to the 8086 but more fully integrated with its support chips; and the 80286, a processor with much higher aspirations than its forebears, including the ability to handle 16 megabytes of physical memory (as opposed to the 1 megabyte available to the rest of its family). The 80286 microprocessor was, of course, IBM's choice for the high-performance AT personal computer.

Another important difference among turbo boards is the speeds at which they operate. In general, the higher the speed, the faster the chip—and the turbo board—will think. Some turbo boards now operate at 10 MHz, and faster products are on the drawing board.

Turbo boards also differ as to how they I handle and adapt to the rest of your PC. I Some involve genuine brain transplants: They require that you remove your computer's microprocessor and connect a large card to its empty socket. All of the circuitry of the large expansion card serves as a unified replacement processor. Another style of turbo card works in conjunction

with the 8088 in your computer, handling the high-speed thinking while leaving the everyday chores, like running the disk drive and controlling the display, to yosystem's old brain. A third alternative is to replace the whole system board, including its microprocessor, with one designed around a faster and more powerful electronic brain.

Peter Norton's Syshfo test is helpful in evaluating accelerator boants. (Editor's note: The Syshfo test was also used to evaluate the computers reviewed in this issue.) The test, part of Norton Utilities 3.0, is a rough indication of capability and speed based on the computational performance of the processor. I/O access, for instance, is not considered.

Here's a look at some of the choices currently available to quicken the pace of your PC's thinking.

## Quadram Corporation's

**Ouadsprint** 

though in testing the Quadsprint proved to be a modest performer, rating roughly twice the speed of a standard FC, it cams a high recommendation for its case of installation and use. You can probably have it running in 10 minutes and double the speed of your PC without the least bit of bead-scratching.

The heart of the Quadsprint is an 8086 microprocessor operating at 10 MHz. That speed is further enhanced, according to Quadram, by using high-speed cache memory to store about 4K bytes of instructions and data for quick retrieval. However, no benefit from this technique is evident from the benchmarks, although other software may show greater performance

inprovements.

A microprocessor replacement, the

A mit-orporessor papeacement, inc Quadaprint requires that you pop out your Quadaprint Corporation 4.355 International Bird. Necross. CA 3005 Necross. CA 3005 List Price: 5465 Microprocessor: 8866 Clock Speed: 10 MHz PC's 8088 microprocessor and plug a cabel from the board into the vacant socket. Once the 10-inch, medium-length board is screwed into an expansion slot, all you do is turn on your PC and compute in doubletime. You may not notice any difference in your computer other than speec. Even the disk drives will snap-to at a seemingly quicker rate.

Quadram could have made installation even easier by including a better chip-pulling tool—although you probably won't worry about the delicacy of the operation because you may never want to put your slow old 8088 back into its socket. Some indication of the proper orientation of the connector that goes into the 8088 socket would be a helpful inclusion in the instruc-

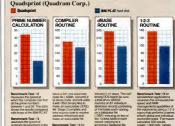
tions. Overall, the Quadsprint is probably the most economical and trouble-free enhancement you can make to the performance of your PC. Although its tested performance rate at the bottom of the list bere, it's in genuinely fisst-paced company. It will likely make your PC outrun all factory-equipped PC-compatibles except for the latest 80286-based desired.

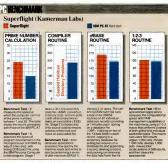
## Kamerman Labs's Superflight

n-board the Superflight, you'll find an 8086 microprocessor ununing at up to 10 MHz. As a microprocessor replacement, the entire circuit board, which takes up the full length of a single PC or XTE expansion slot, substitutes for your system's native 8088 microprocessor.

Yank out your old 8088—Kameman Labs provides a helpful chip-pulling good sool—and slide one end of a short cord into sool—and slide one end of a short cord into tis empty socket and the other end into the Superflight board, and you've just goosed by your system into racing at more than double-time. As with the Quadsprint, you don't have to bother with utility programs or complex software installation processes at all.

Because a few speed-sensitive programs might crash if they encounter 10 MHz where they expect 5, the Superflight includes both a hardware switch (on the retaining bracket of the card) and a software switch that will flip the on-board clock, and hence the microprocessors thinking





speed, between the fast 10-MHz and the slow 5-MHz rates.

Some of the space on the Superflight is for two banks of suckets for nine memory chips each. According to the decumentation, the chips on the Superflight board to the supe

Superflight
Kumerman Labs
8054 S. W. Nimbus Ave.
Beservitor, 108 97015
8054 S. W. Nimbus 108
8056 S. W. Nimbus

vided between the two kinds of memory.

One 18-chin bank of fast memory re-

One 18-chip bank of fast memory resides on the Superflight board itself. Additionally, a header allows further memory expansion on a stacked daughterboard. Another header permits additional expansion directly from the PC bus.

Even using slow memory alone, the Superflight can give your system a substantial speed boost. On Peter Norton's Sys-Info test, it scored 2.3 times faster than an unadomed PC, faster than either the Compaq Deskpro Model 4 or the AT&T PC 6300, both of which have 8086 microprocessors as standard equipment.

The early-model Superflight that I teach of did reveal one very important shortcoming. When I ran PC Magazine's assemble-and-compile benchmark test, the card would not properly create object files and even changed already existing filenames by adding strange charactly existing filenames by adding strange charactly exists to the names of its singlemindedly stack to the names of its singlemindedly stack to the names of its singlemindedly stack to the names of its them beck to what I wanted. This bug will, though the properties of the name of

## Orchid Technology's PCturbo 186

s one of the original high-performance add-in boards, it's perhaps understandable that the PCturbo 186 has lent its name to the whole genre of similar products. Its long life is a testament to its value and performance—and more importantly, its development.

The PCrurbo 186 proved to be the most trouble-free tandem-type processor to install and use, springing instantly to life and running everyfining loculations with out a histo. It even sear-host throughout on yostem, discovered I shad an Enabance Graphics Adapter, and then saked whether the products of the products of the products and products whether the products should, the PCrurbo 186 software gave me the option of doing in the observation policy and the option of doing a shead, the devil army side.

The PCurbo 186's 80186 microprocessor lacks the glory of 18 big border 80286, and even running at 8 MHz, it turned in a performance not quite as high as that achieved by the AT: 3.7 times faster than a PC on the Systinfo test. Nevertheless, that's more than enough to leave the unsorned PC and most 8086-equipped clones far behind.

The best near of the PCurbo 186 is how

well it integrates with your PC system and delivers its improval performance even under the handicap of slogging through floopy disks. Although early versions of the product I tried (nearly a year ago) had problems handling most I/O functions, the current version of the board and software ran the display—probably the most troublesome aspect of interfacing a landern and the problems and the probability of the problems and the probability of the problems and the probability of the prob

As a tandem-type board, the PCturbo B6 hardware is no more difficult to install than any other expansion card. Software installation, however, is more complex, involving setting up several files properly. Fortunately, the process is more than adequately explained in the printed documentation accompanying the PCturbo 186. In fact, even if you don't read the instruc-

Microprocessor: 8086

Clock Speed: 10 MHz

tions, you can bring the PCturbo 186 to life merely by running a single program, called Turbo, without making any other modifications to your existing software. Of course, taking full advantage of the PCturbo 186 requires some tinkering with your system software.

Because the PCturbo 186 does not replace your PC's 8088 microprocessor, you can switch between normal PC operation and turbo performance by running a utility program. When the turbo is purring away, the 8088 doesn't just twiddle its thumbs; it does all the I/O processing.

The PCturbo 186 is a complete computer in itself and uses its own, on-board, 16bit data bus memory. The main board, which requires a single full-length expansion slot, can be stuffed with 256K bytes of 64K-bit RAM chips. If you want additional memory, a daughterboard with a capacity of 384K bytes piggybacks on top. You can also stack a serial port elsewhere on the board. Even when you've stacked it into two layers of circuitry, however, the PCturbo 186 fits into a single slot in a PC. In an XT, the adjacent slot should be vacant

On the mounting bracket of the PCturbo 186 you'll find an extra feature that you should hope you never need, a hardware-reset button that unlocks the PCturbo 186's processor should it ever lock itself up-say, if one of your home brew assembly language programs goes astray.

Although the PCturbo 186 no longer rates as the top performer among add-in products, it does earn high marks for proven reliability, for excellent screen handling, and for being one system that has been around long enough for all the troublesome little bugs to have been thoroughly smashed into compliance.

## PCturbo t86 Orchid Technology

47790 Westinghouse Dr. Fremont, CA 94539

(415) 490-8586 List Price: 128K installed \$895: 256K \$945. daughter card without RAM, \$165; each bank of 128K, \$50

Microprocessor: 80186 Clock Speed: 8 MHz

## PCturbo 186 (Orchid Technology)

## PCturbo 186









Linker program Stage 1



Version 2.41 tasks. The self-timing DOS batch file runs e total of six dBASE routines on 81 individual on a database file ( OBF) indexing on two of the 13 data fields in each

IBM PC AT Hard disk



## Wave Mate's Bullet-286

eplacing the system board of a personal computer-the vital essence that makes the machine work-might at first seem more of a challenge than any mortal without a degree in engineering would want to tangle with. Installing the Bullet-286 high-performance replacement system board proves that such worries are totally unjustified. The only tool necessary is a screwdriver, and the whole job can be accomplished in 10 minutes.

The reward is great. An XT souped up with the Bullet-286 board outruns an AT by a good margin, turning in speeds of 6.9 to 7.1 times faster than the PC's on Peter Norton's SysInfo test.

The Bullet-286 is exactly the same size and shape as an XT (or Portable PC) system board and uses the identical mounting scheme and hardware, so it cannot be used to enhance a standard, five-slot PC

The design goal for the Bullet-286 is to speed up the XT's performance, not to emulate an AT. Consequently, it runs programs that the AT may encounter difficulties with-like early versions of Flight Simulator.

Even though the Bullet-286 uses the same 80286 microprocessor running at the same 6-MHz speed as the AT, it handles XT programs faster than the AT because its microprocessor has no wheel-spinning "wait states" to deal with-its brain is always at work, ready to do your bidding. But because the Bullet-286's expansion bus is identical to that of the 8-bit XT (rather than the 16-bit AT), the AT has a speed edge in I/O intensive tasks. like disk access. An optional 80287 numeric coprocessor will further quicken the pace of number crunching.

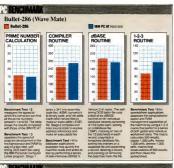
Unlike the XT system board that it re-

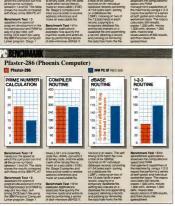
## ullet-286 Wave Mate Inc

14009 S. Crenshaw Blvd. Hawthome, CA 90250

(213) 978-8600 List Price: 256K, \$1,995; 512K, \$2,395; 640K, \$2,495; I megabyte RAM, \$2,995; 80287 coproces-

sor, \$375 sor: 80286 Clock Speed: 6 MHz CIRCLE 666 ON READER SERVICE CARD





places, the on-board memory bus of the Bullet-286 is a full 16 bits wide for fast memory access. Up to 1 megabyte of RAM in 256K-bit chips can be loaded into the Bullet-286's four banks of nine sockets. Of course, only 640K bytes of that total is addressable by DOS.

and is addressurate by J.O.S. Schreguists no softbox of the state of the state of the state of the state of the box of the state of t

Compared with other turbochargingproducts, the Bulle-286 has a big advantage in screen handling and disk access. Utilike tanden turbon, it does not need to go through an additional layer of processing—your dol 8988—to reach the record disk. As a result, the Bulle-286 scored the highest on the disk-intensive benchmarks used for evaluation. Although the Bulle-286 is the most radical solution to slow response from your XT, it could be the most effective one.

## Phoenix Computer Products Corporation's Pfaster-286

faster-286 is an expansion card
that's designed to add as much
AT performance and compatibility as you can possibly fit into a standard PC's case. With this board, you'd expect compatibility, it's the first hardware
product from Phoenix Computer Products,
the same folks responsible for the Phoenix
BIOS chips that make a legion of other
manufacturer's computers almost perfectly IBM compatible.

The 80286 microprocessor on the Pfaster-286 board stretches its legs to run at a full 8 MHz. The result—at peak performance—was a rating of 9.1 times the processing speed of a standard PC. Additional speed boosts are possible by adding an optional 80287 numeric corprocessor.

A tandem board, Pfaster-286 works in

conjunction with the 8088 inside your PC or XT without replacing it. You merely slide the extra power in as if it were any other expansion card. Software installation is somewhat more cumbersome: You need separate CONFIG.SYS- and AUTOEX-E.BAT-like filtes for both your PC's ordinary operating mode and its Pfast mode. Of course, once you've installed the software, you don't have to deal with the complex arrangement of files again.

The 80286 microprocessor shares the full-length expansion board with four banks of 18 sockets, capable of handling up to 2 megabytes of 256K-bit RAM chips (1 megabyte is standard). Two headers

also adom the board, probably for future expansion. One duplicates the PC expansion bus, and the other appears aimed at direct-memory expansion.

Memory beyond 640K bytes can be used by the Pfaster-286's 80286 micro-processor as extended memory, but doing 100 processor as extended memory, but doing 100 processor as extended memory, but doing 100 processor as extended memory. For instance, when running 180m's DISIK (the high-speed virtual memory disk that comes with DOS 3.0 and 3.1) in extended memory-promance on the SysInfo test fell from 9.1 to 6.3 (as opposed to the PC standard to the PC

The Pfaster-286 handling of the color screen was disappointing. Characters seemed to appear on the screen in quick blocks rather than in smooth sequence. It looks unnatural and seems to take longer than when the 8088 is in control. The poor

Pfaster-286

Phoenix Computer Products Corporation 1420 Providence Highway. #115 Norwood, MA 02062 (617) 762-5030

List Price: 1 megabyte RAM, \$2,395 Microprocessor: 80286 Clock Speed: 8 MHz CHICLE 868 ON READER SERVICE CARD

## Making Fast Faster

If you're still spinning your wheels with the AT's 6-MHz performance, replacing the system crystal with a faster quartz will give you speed to burn.

ou wouldn't expect the performance of IBM's most powerful PC to be attricially limited, but the AT actually has a built-in governor that restricts its high-speed potential. Although the 80286 microprocessor that does the AT's thinking is designed to operate at a speed of at least 8 MHz, IBM runs it at a conservative 6 MHz.

The speed at which the AT thinks is set—and limited—by the vibrations of a precision quartz crystal. The frequency at which that crystal operates is the major obstacle between the AT and greater performance. By replacing the AT's stock crystal with one that operates at a higher frequency, you can make your AT perform at least 35 percent faster.

Although higher-speed operation is not officially senetioned by IBM, virtually all experimenters report that their ATS operate flawlessly at 8 MHz. Those who have ventured further into the unknown, to 9 MHz and beyond, have found that their machines become somewhat temperamental and even temperature-sensitive—sometimes they don't, the speed of the spee

If you're curious or want the absolute best performance from your computing investment, you can easily replace the crystal in your AT yourself. The job requires no tools other than the nut driver you need to get inside your system unit.

The crystal is a small, rectangular, silver "can"—sort of a squashed cylinder—located in the right-rear quadrant of the AT system board. Because it is socket-mounted, you can readily slide the crystal out and stick another one in without soldering.

The AT is designed to operate at onehalf of the frequency of its crystal. Hence, the stock AT uses a 12-MHz crystal to achieve standard performance from its 80286 microprocessor. To get 8-MHz performance, you must use a 16-MHz crystal. Using an 18-MHz crystal gives you a superfag 9-MHz.

The following companies advertise suitable replacement AT crystals at prices from \$15 to \$50:

Applied Management Systems P.O. Box 4795 Whittier, CA 90605 (818) 810-8443

Ariel Corporation P.O. Box 866 Flemington, NJ 08822 (201) 788-2788 Megahertz Corporation P.O. Box 1289

Salt Lake City, UT 84110 (801) 535-4374

Head Down to the Shack

If you're adventuresome, you can find a suitable replacement crystal at most Radio Shack stores. However, the Radio Shack product is not guaranteed to work in your AT, and it probably won't be a perfect file—the diameter of its leads is smaller than the socket holes in the AT. Often, however, bending the leads over double on the Radio Shack crystal makes for a sufficiently tight fit.

One company Buzzwords International of Cape Girardeu, Missouri, now promises even greater performance than 8 MHz from your AT when you install one of its kits, which include an experimental higher-speed 10- or 12.5-MHz 80286 microprocessor and crystal to edge performance up to 12.5 or 15 MHz.

If you venture into ultra-high-performance territory, remember that the microprocessor is not the only speed-sensitive component in the AT. You'll be stretching all of the computer's circuitry to its limits. You might want to use faster memory chips.—Winn L. Rosch performance on the Bench #2 program is mostly a result of the screen handling.

According to Phoenix, the Pfaster-286 has better control of the monochrome screen than the color screen used in these tests. Undoubtedly, even the color performance will be enhanced as the product is more fully developed.

The Pfaster-286 lets you switch between the 80286 microprocessor and the 8088 native to your system using a pair of software programs. You'll probably only want to switch to the slower speed when uncooperative programs look directly at

the system clock to time their processing. The version of the Pfaster-286 that was tested crashed during execution of the dBASE II routines in Benchmark Test #4 and thus could not run that benchmark. According to the manufacturer, the problem is a hardware incompatibility between dBASE II and the 80286 microprocessor. A hardware modification is being made (and should be complete by the time this story is published) to the Pfaster-286 card to overcome this shortcoming.

Although the benchmark performance of the early version of the Pfaster-286 that was tested suffered from its below-par I/O interfacing, the board will give any PC system a manifold performance improvement. For instance, when the Bench #3 test was run from a VDISK in extended memory, the time fell to 1:32 from the 4:55 scored on floppy disks. That's an impressive speed increase over an IBM PC.

## Applied Reasoning Corporation's

PC-elevATor

lthough still on its shakedown cruise, the PC-elevATor proved to be a very speedy and promising product. Indeed, the 8-MHz 80286 tandem processor can turn your PC into a formidable information processor. Its performance score of 9.1 times faster than the PC was equaled only by the Phoenix Pfaster-286 and beat only by an experimental supersibling from Applied Reasoning loaded with 10-MHz hardware that gave a 16.5 score. (Unfortunately, the availability of that superfast board depends on the supply of high-speed chips from Intel, so it does not figure in the official re-

sulte ) The PC-elevATor uses its own, onboard 16-bit memory. Enough space is allowed on the card for four 18-chip banksin fact, enough space to stuff 2 megabytes of 256K-bit chips on a single card. According to Applied Reasoning, the PC-elevATor supports the 80286 extended memory and will run VDISK there. A socket is also provided for an 80287 numeric coprocessor.

For this board, hardware installation involves nothing more than slicing the PCelevATor into any full-length expansion slot. However, it should be noted that the early version of the PC-elevATor's installation software was somewhat troublesome. According to the manufacturer, a new menu-driven version is planned soon that will include special provisions for installing the PC-elevATor in conjunction

with nonstandard hardware. Unlike early runs of many personal computer products, the PC-elevATor ac-

celerator board has no hardware natches. Overall, the accompanying software too appears well thought out. The card's screen handling is superb. It kicked throughput up on the color monitor used in the test system without showing any flick-

er, tears, or jumps,

At the time of this review, several bugs still scampered through the supplied software, however. The most irksome problem I encountered while reviewing the product prevented me from running the prime-number test. Applied Reasoning's PC-elevATor failed to understand a software interrupt issued by compiled BASIC.

## According to the manufacturer, this prob-PC-elevATor

Applied Reasoning Corporation 765 Concord St. Cambridge, MA 02138

(617) 492-0700 List Price: 1/2-megabyte board, \$1,695; 1-megabyte board, \$1,995; 2-megabyte board, \$2,495 Microprocessor: 80286

Clock Speed: 8 MHz

CIRCLE 669 ON READER SERVICE CARD

## PC-elevATor (Applied Reasoning) PC-elevATor IBM PC AT Hard disk PRIME NUMBER COMPILER **dBASE** 1-2-3 CALCULATION BOLITINE ROUTINE ROUTINE 420 -245 -25 300 175 100 140 180 10 Version 2.41 tasks. The set timing DOS batch file runs a total of six dBASE routines on \$1 individual binary code and link edits with other binary files to of 154 bytes each sorting on a database Ne ( DBF), indexing on two of the 13 data fields in each as the results compared those of the IBM PC AT inchmark Test -3

nohmark Test + 4 for

Linker program Stage 1



## TURBO BOARDS

Manufacturer	Model	Category	Microprocessor	Clock speed	Ports	Expansion slots
ш	ITTxtra XP	desktop	90286	6 MHz	1 RS-232 1 parallel 2 COM	5 8-bit 0 16-bit
COMPAQ	Deskpro 286	desktop	80286	8 & 6 MHz	1 RS-232 1 parallel 2 COM	
COMPAQ	Portable 286	portable	80286	8 & 6 MHz	1 RS-232 1 parallel 2 COM	
Kaypro	Kaypro 286i	desktop	80286	6 MHz	1 RS-232 2 parallel 4 COM	28-bit 616-bit
Gulfstream	Professional Computer 88	desktop	8068	4.77 MHz	2 RS-232 1 parallel 4 COM	
AT&T	AT&T PC 6300	desktop	80286	8 MHz	1 RS-232 1 parallel 2 COM	78-bit 0 16-bit
Gulfstream	Professional Computer 286	desktop	80286	8 MHz	0 RS-232 2 parallel	8 8-bit 0 16-bit

Turbo	Board	Features

Manufacturer	Product	Category	Microprocessor	Clock speed		
					Bus width	Memor chip spaces
Quadram	Quadsprint	replacement	8086	10 MHz	N/A	N/A
Kamerman Labs	Superflight	replacement	8086	10 MHz	16	10*
Orchid	PCturbo 186	tandem	80186	8 MHz	16	36'
Wave Mate	Bullet-286	system board	80286	6 MHz	16	36
Phoenix Computer	Pfaster-286	tandem	80286	8 MHz	16	72*
Applied Reasoning	PC-elevATor	tandem	80286	8 MHz	16	72
*Additional expansion poss	bie through daught	terboard.				

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Photon Software, Inc. 14021 N.E. 8th. St. Bellevue, WA 98007 lem can be repaired with a software modification that newer versions of the product

# will incorporate. Conclusion

Any of the performance-enhancing systems examined here will make your old PC's heart throb faster. Which is the best accelerator board? If you are looking for ease of installation and the lowest cost solution, the Quadram Quadsprint would be the best choice for you. Similarly, the easy-to-use ver much faster Wave Mate

Bullet-266 is only slightly harder to insular and slightly more expensive. On the other hand, if you are on good terms with your personal computer, if you know the initimate details of its life, if you are willing to do more work for its utmost performing PC-elev-Arror or the Phoenic Pistater-268 will deliver. The best compromise between ease of the Corbid PCLIMO 186. The best turbo board, uttimately, is one that best matches your particular new forms and the size of the property of the pr



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CIRCLE 393 ON READER SERVICE CARD

# HENRY FORD TO CREATE A FOUR:



Although we're told that saddlemakers were all for the idea, and submitted some rather startlingly innovative (ideas, breeding the perfect lamily horse just didn't seem right to Mr. Ford. His mind took a different tack, a new line of thought. Al line of assembly, A whole new approach to providing people with a way to get from where they were... to where they wanted to gro

A whole new approach. That seemed like an excellent starting point for a relational database. We did not want to simply rewrite an arcane programming language or rework an old mainframe database.

Our goal was to create a relational database that would, for the first time, really combine power and ease-of-use. And we wanted to bring you that combination no matter what your application requirements or computer sophistication.

The goal has been achieved. If power and ease-

of-use seem to be a paradox you've heard before but never seen, you should know our name is Paradox."

Paradox brings what used to be the contradiction of power and ease-of-use together in several concepts.

First, Paradox brings an easy-to-use Lotus-like standard menu together with a powerful way to interact with the information in your database. With Paradox you simply type in an example of the information you seek, rather than having to write a line-by-line program to do thinss like ioin different tables or do calculations.

Second, Paradox brings a rather revolutionary new concept to personal computer technology. Known in artificial intelligence circles as "machine reasoning." Paradox uses this feature to evaluate your request and, on its ours, writes a program for you that seeks the answer in the fastest possible way Paradox then exemsers in the fastest possible way Paradox then exe-

# DIDN'T SET OUT PASSENGER HORSE.



cutes this program and produces the answer. You don't need to know how the information is organized, how to best approach the problem or how to write a program.

The advantages of these features, aside from being rather fascinating we think, are incredible speed, an easy-going experience and a real opportunity to do more with a database than ever before.

If all of that sounds terrific but you're concerned about "driver's education," don't worry. The familiar Lotus-like menu is only one of many ways we've made Paradox easy to use. You'll hum right along.

There's a lot more we'd like

to tell you about Paradox (which explains the very last paragraph), but you've really got to see it. All of this may give you that "easier said than done" feeling, when in truth, it's now "easier done... than said." We hope you'll visit your computer retailer and see it all for yourself. You'll see a lot more than just an improved

breed. You'll see a whole new way to handle data on the IBM' PC line, the Compaq' line and other 100% compatibles. A new way to get where you want to go with power and ease. We started from a clean base and now, it seems, we've left the others in the proverbial dust. Paradox The Base of Departure.

Part of the "tot-more" we'd like to tell you: Easy importing and exporting of data from Lous 1-2.". Symphony," dBASE II, dBASE III, "PFSPILE," VisiCale" and ACIJI Complete report generator) Scripting (macros) with Paradox memorizing key strokes and commands as you go/ Jour oun full-deutred application programming language! Forms that you can design / Unlimited number of tobles, each up to 260 million characters.

## THE BASE OF DEPARTURE.

CIRCLE 479 ON READER SERVICE CARD



# The Project Scheduler **NETWORK**



key to a successful project is good planning. You can't afford to overlook critical costs and deadlines. COMPREHENSIVE

## PROJECT MANAGEMENT The Project Scheduler Network will

help you meet deadlines and beat cost targets using effective project scheduling. resource planning, costing, and status

tracking. Advanced screen graphics. Produce Network diagrams, Gantt charts, and

color graphs to provide the concise information you need for timely decision

Work Breakdown Structure (WBS). Organize project activities to produce summary level schedules and reports. Multiple projects can be integrated to present project level schedules and total resource utilization.

Baseline schedules. Save them to compare with current schedules for schedule tracking. Actual, original plan and current plan costs can be graphically compared for cost tracking,

Comprehensive report generator Simplify communications with management by synthesizing project information into presentation-quality hardcopy reports and graphs.

SCHEDULE WITH THE

CLICK OF A BUTTON The Project Scheduler Network provides

the most advanced software technology available. Start with our mouse controlled menus to select spreadsheetstyle input templates to enter your project data.

Graphically build your dependency Network with only a "click of a button." Zoom to view the Network at selectable resolution levels. Now use the mouse to edit the Network to your satisfaction.

Select a Gantt chart and obtain schedules at any WBS level with a single click. Window resource graphs with the schedule to analyze resource allocations. And finally, select our integrated graphics to view color histograms, bar charts, and line plots of project resources and costs.

## **FEATURES**

- Critical Path Method Network Analysis
- Gantt Chart Work Breakdown Structure (subtasks)
- Multiple Project Integration Tracking with Baseline Schedule and
- Complete Status
- Resource Scheduling
- Financial Planning and Tracking
   Presentation-quality Graphics
- PECULIPEMENTS • IBM® PC. XT. or AT
- PC-DOS 2.0, 2.1, or 3.0 · Monitor plus iBM graphics adaptor
- . IBM or Epson graphics printer 320K RAM (minimum) Mouse (Microsoft compatible)
- Two disk drives (one double-sided) IBM or HP plotter optional
- Project Scheduler Network is a trademark of School *ISM is a registered trademark of International Business Machines Corporation.

(415) 570-7700



# Are

# Near-Letter-Quality

# Printers Near Enough?

are another equality (NLQ) printed for the best of a claims to fer the best of both worlds. They're dot matrix printers that are ignerally cheaper and faster than daisy wheel printers but whose output quality wheel printers but whose output quality wheel printers are also called "correspondence quality," meaning they're good enough to print letters by using bolder characters with sharper definition, even if they fall short of oning a perfect typewriter imitation.

In the past, you had no choice but to use a daisy wheel printer for jobs that were traditionally done on a typewiter. Nothing but a dot matrix machine would do, however, if the speed of output mattered more to you than a dot matrix in waiting the speed of output mattered more to you than good-looking text. It was usually clear which type of machine you needod, although sometimes your mix of tasks made it essential to own printers of both types.

Today, the question of whether a neartetter-quality printer is near enough can't be answered simply by finding out what technology a machine uses. The newson more sophisticated dot matrix printers use a wide variety of techniques to improve a papearance of the characters they print (see sidebar "Dotty Tactics for Letter Quality"). But their effectiveness a producing Today, many dot matrix printers can produce "correspondence quality" pages. If you need greatlooking output, these printers may fit the bill and save you money.

letter quality text can only be measured subjectively. Subjectivity raises some problems.

Since many early dot matrix printers produced such bad print, it's easy for a slight improvement in output to look "almost letter quality" in comparison. But are the results really good enough to meet your needs?

Using any dot matrix printer might be out of the question in circumstances where prestige is an issue. To make the best imtition of the control of the control of the typed individually, even on close inspection. In most cases, however, by pewniten quality for its own sake isn't called for. All that matters is whether a printer can produce characters that meet a typewriter's standard of legibility. An Imaginary Case

Imagine you are a free-lance writer, using your personal computer and word processing software system to write a story for a magazine. When you print out the finished manuscript and mail it to the publisher, you feel pleased at how much time and effort you saved, thanks to your speedy printer.

That same printer, however, may cause you nothing but rouble when your manuscript his the "slush pile," the publisher's collection of unsolicited manuscripts. Some assistant editor eventually opens the envelope and pulls out a barely legible computer printout. The bad dot matrix printing might be enough to make the editor decide to reject your manuscript on the post, it's not that the editor has any prejudical your storp was much harder, to read that the end of the editor has made to the editor has any prejudical your storp was much harder, to read that the end of t

This problem isn't limited to free-lance writers, of course. A customer may receive a "personalized" form letter; a client may get a computer-printed report. Each is influenced to some degree by the appearance of what they read. If you're the salesperson or consultant at the sending end,

## **Dotty Tactics for Letter Quality**

The newer, near-letter-quality dot matrix printers use a wide variety of sophisticated techniques to achieve their special effects.

W shile a daisy wheel printer needs to strike the paper only once to produce a fully formed letter, a dot matrix printhead needs to hit the page many items with dozens of individual dots to produce a single character. By using more dots to formeach character, the better dot matrix printers are able to approach typewriter quality by producing letters that are bolder and smoother, with sharper definition and attractive details.

Better printheads can achieve superior results with a cluster of more and finer pins that cover the same area on the page as do ordinary ones. Or a single row of pins can move and strike different horizontal and vertical positions, thus getting a cumulative result that's the same as with additional pine.

with additional pins.

More pinstrikes per letter isn't all that

a printer needs to make a better impression. As with typeset fonts, it takes an artist's sense to arrange fine patterns of dots to create a set of characters that are individually attractive and that produce text that can be read with ease and without distraction.

A typical dot matrix printhead has a vertical row of nine pins. To form a single character in draft mode, the row of pins strikes five times as the head moves across the page. Each time the printhead strikes, it extends or retracts different combinations of the nine pins to produce a one-fifth slice of the total letter.

The print sample in Figure A shows how the letters K and r are typically formed by a 9 pin printhead. Even at normal size, the individual dots would be visible. Characters formed in this way are recognizable but don't look at all like their familiar typewritten forms: In fact, they'm uglv.

Somewhat smoother letters can be produced if the dots are allowed to overlap horizontally, with the row of pins striking nine times in a space that's only five dots across. The gaps between dots to the pine the

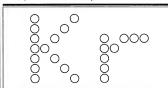


Figure A: This sample demonstrates how letters are farmed by a 9-pin printhead.

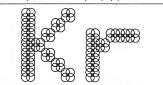
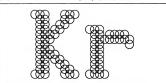


Figure B: Each dot in the basic matrix can be repeated for denser, smoother characters.



are thereby greatly reduced, but the nine | Figure C: A 24-pin printhead, with vertical and horizontal overlap, can create serifs.

horizontal rows are still visible.

Even finer results can be produced with a printhead that allows vertical overlapping either by having two staggered rows of pins, or by having its single row of pins make a second pass in a slightly higher position.

The combination of vertical and horizontal overlap gives a printer maker great freedom to design distinctive character sets within a matrix that's 10 by 18 or even finer. The simplest way to use this capability is to repeat each dot in the basic 5 by 9 character four times, as in Fig-

By using more discretion when forming characters within the matrix, you



The schematic drawing illustrates the ggered rows and positioning of pins in ar-letter-quality printheads.

could have dense and smooth letters that are not only more beautiful but easier to read as well.

You could also give the letters more personality with serifs, the ornamental details at the ends of each line forming the letters as represented in Figure C Serifed letters are sometimes called Roman; those without serifs are called Sans Serif or Gothic. The 10 by 18 matrix even allows thin characters to be produced without visible breaks between dots -Paul S.R. Chisholm

it's important that the printout look good enough to prevent your reader from paying more attention to deciphering the characters than to the content of the correspondence

### The Test

Which printer is best to use in these situations? It depends. Some printers are better than others, and some readers, more tolerant.

I contacted a number of manufacturers that have claimed their dot matrix printers are able to produce near-letter-quality or correspondence quality output. I asked them to make a set of 20 print samples on their machines, reproducing the typewritten model page, part of which is shown in Figure I, as closely as possible.

This sample manuscript page used the complete set of alphabet, numeral, and punctuation characters in the course of several paragraphs. Also included were some deliberate typographical errors. The most revealing portion proved to be the final paragraph, in which underlining might interfere with lowercase letters and punctuation marks on most machines included in the survey.

I encouraged each manufacturer to use every hardware and software trick its machine could muster to produce the best possible sample page. Some manufacturers sent multiple printouts to demonstrate alternative typefaces or the features of other printers in their lines. (These additional samples were rated in the survey, but only those with significant differences are mentioned.)

To evaluate these printouts, I sent collections of these sample pages to several science fiction editors. These editors would, I felt, be good judges of the quality of a printed page, because they're accustomed to seeing a lot of manuscripts produced on personal computers with word processors. (I decided against using computer magazine editors as testers because I suspect, that since they deal with it on a daily basis, they are already inured to bad dot matrix printer output.)

I asked the science fiction editors to evaluate each page as if it were a page from a submitted story manuscript and to give the printer that produced it a rating from the following scale:

Preferred: "If only all manuscripts looked this good!" Acceptable: Not perfect, but good

enough to be read.

Barely Acceptable: If a manuscript printed on this printer were submitted, it would be read. However, the print quality is bad enough to influence the person reading it.

ABCDEFGHIJKLMNOPORSTUVWXYZ abcdefghijklmnopqrstuvwxyz !"#\$%&!()*+,-./0123456789:

s is another, using single see? Colons aren't enou

n) (and parentheses). This is a new paragraph.

If the printer can underlin

Figure 1: Part of a sample page produced with a typewriter. Unacceptable: If a manuscript were printed on this printer, it would be re-

To determine a total score for each printer, I assigned it three points for each Preferred rating, two points for each Acceptable rating, one for each Barely Acceptable rating, and no points for Unacceptable ratings. Since nine editors participated in the survey, a perfect score would be 27 points. Note that a one- or two-point difference between two printers probably doesn't mean much, since a single editor's judgment could account for

### that small a variation Double Blind

turned unread.

To safeguard the objectivity of the results, I conducted this survey as a "double blind" experiment. I didn't tell the printer manufacturers who would see the samples, nor did I tell the science fiction editors which near-letter-quality printers were used to produce the samples: Each print sample was identified only by a code number. This method helped eliminate the influence of bias such as the prejudice some editors have expressed against certain printer models. For example, one editor

warned me that he considers Epson printers in general to represent what he dreads most in dot matrix submissions; in this blind test, however, he gave a favorable rating to the Epson LQ-1500.

What did the science fiction editors look for? Stanley Schmidt, editor of Analog, said that the main things that bother him about dot matrix copy are "faint appear-

The quality of a printed page isn't determined solely by the hardware that produced it. Be sure your word processing software is installed properly, and use

hardware switches or software instructions to specify the most effective printing mode.

ance, eccentric character shapes that are hard to recognize or can be confused, and dots so sparse that I'm more conscious of those than of the characters they com-

Schmidt also criticized some printers for their inability to underline or to form characters with descenders, the part of the character that falls below the line in letters such as g and y. This last problem was notorious in some older printers (and even some CRT displays, such as that of the original Kaypro II). Since those printers lacked the extra two pins in the printhead needed to form true descenders, they raised those letters in the character set two rows so the descenders were at the same level as the bottoms of normal letters. To an editor's eye, such juggled rows of characters represent something far from letter quality.

### Descending Quality

All of the printers included in this survey were able to print true descenders and underlining. Unfortunately, most of these machines still had some trouble printing descenders and underlining at the same time. "An underlined p. o, q, and g are al-

most impossible to tell apart," as Amazing Stories's editor George Scithers pointed out. The letters i and j also become ambiguous when underlined. Scithers said he lowered his ratings of several printers because they handled underlined descenders

hadly. Other editorial criticisms revealed that the quality of a printed page isn't determined solely by the hardware that produced it. It's clear that some print samples weren't as good as they might have been if the person who produced them had taken more care. Any printer can be improved with a fresh ink ribbon. Be sure your word processing software is installed properly to make full use of your printer's features. And make judicious use of those features; some of the editors were distracted rather than impressed by right justification, for example. Most of all, always be sure to use hardware switches or software instructions to specify the most effective printing mode-not the draft-speed defaultwhenever it's important that you produce

good-looking pages.

Admittedly, these aspects of printing quality, which were under human control, influenced the judges when they rated the printers. In my comments on each printer, I've tried to point out any avoidable defects in its sample page that might have lowered its soore.

### Conclusions

At least two editors judged each printer Acceptable. The four highest-rated machines received Preferred and Acceptable ratings from all but one editor. These printers were the Epson LQ-1500, the Florida Data OSP-125, the Texas Instruments TI 855. and the Toshiba 1340.

The prevalence of high ratings is a clear sign that many of today's dot matrix printers are near enough to letter quality. In fact, the word "near" falls short of describing the best machines, which produce text that is virtually indistinguishable from a typewriter's or good daisy wheel printer's output.

Ultimately, are near-letter-quality print-

ers worth the investment? After all, the least-expensive NLQ printers with suitable quality list for about \$500—in the same price range as inexpensive daisy wheel printers. And the higher-quality dot matrix printers are priced comparably to daisy wheel machines in the middle and high end of the market. The highest priced dot matrix printers in this survey cost as much as some laser printers.

These NLQ Printers are not redundant pieces of hardware in the market, however; they give you a wider choice of printers at any price you might be able to pay. Pur-

The prevalence of high

ratings is a clear sign that many dot matrix printers are near enough to letter quality. In fact, the word "near" falls short of describing the best machines, which produce

text virtually indistinguishable from a typewriter's output.

chasing one of these near-letter-quality mean you won't have to buy both a daisy wheel and a dot matrix primer. If you have a limited budget and a great deal of text to print, but print quality isn't particularly critical, consider investing in one of the less expensive NLQ dot matrix printers. And if you're prepared to spend at least \$1,500, you can buy a fast dot matrix printer that comes extremely close to letter quality.

Paul S. R. Chisholm is a member of the technical staff at AT&T.

### Our Editor Judges

The celitors participating in this survey were Susan Allison of the Berkley Publishing Group, John F. Carr of Jerry E. Pournelle and Associates, Claire M. Eddy of Bacn Books, Ruth Hapgeod of Houghton Milflin, Shawna McCarthy of Bantam Books, Stanley Schmidt of Analog, George Scithers of Amazing Stories, and two fiction editors at Playboy and Omni, who preferred to remain anonymous.

### WP-6000

WP-6000 Anadex Inc 1001 Flynn Rd. Camarillo, CA 93010 (805) 987-9660 List Price: \$2,295 Pins in Head: 18

Matrix Size: 18×N (matrix width varies for pro-Draft Speed: 150.1

NLQ Speed: 123.3 cps Serif Rat Preferred: 0 Acceptable: 6

ons Serif Ratines Preferred: 1 Acceptable: 6 rely Acceptab Total Points: 13 Total Points: 16 [Reviewed in Volume 3 Number 23, page 243.] BCDEFGHIJKLMNOPQRSTUV 3CDEFGHIJKLMNOPQRSTU

bcdefahiikl noparstuvw

see? Colons aren't (and parentheses).

This is a new paragra If the printer can un The Anadex characters, which appear

CIRCLE 697 ON READER SERVICE CARD

### **DS 200**

DS 200 Datasouth Con uter Corporation P.O. Box 240947

Charlotte, NC 28224 (800) 222-4528 List Price: \$1,695 Pins in Head: 9 Matrix Size: 18×48

Draft Speed: 150. 1 cps NLO Speed: 45.4 cms Preferred: 1 Acceptable: 4

Barely Acceptable: 5 Unacceptable: 1 Total Points: 14 [Reviewed in Volume 3 Number 23, page 227.1 BCDEFGHIJKLMNOPQRSTUVWX ocdefghijklmnopgrstuvw

"#\$&&"()*+,-,/012345678 see? Colons aren't

) (and parentheses).

his is a new paragraph f the printer can unde quite fully formed, are proportionally spaced: The printer accommodates for some characters' being wider than others. Proportional spacing can't be considered a true problem, nor can the rightjustification feature that it makes possible. For many purposes, right-justified output is superior to typewritten copy. But for the reader expecting to see a typewritten letter or manuscript, these fancy features may be jarring. Such bells and whistles are also a dead giveaway that a "personalized" letter came out of a computer.

This printer produces unusual but effective characters. The letters are thin but fully formed in a distinctive style that's crooked and angular without being boxy. The main deficiencies in this sample seem due to lack of care in producing it. rather than to problems with the printer itself. First of all, the ribbon must have been a little old and faded, judging from the lightness of the text. Also, the sample didn't demonstrate underlining because of problems with the word processing interface, although the printer is capable of underlining, according to the Datasouth representative who made the samples.

### CIRCLE 696 ON READER SERVICE CARD

### FX-80

FX-80 Epson America Inc. 2780 Lomita Blvd. Torrance, CA 90505 (800) 421,5426 (213) 539-9140

List Price: \$469 Pins in Head: 9 Matrix Size: 9×9 Draft Speed: 62.7 cps NLQ Speed: 43.1 cps

Ratings Preferred: 0 Accentable: 5 rely Acceptable: 4

Total Points: 14 [Reviewed in Volume 3 Number 23, page 149.]

CIRCLE 695 ON READER SERVICE CARD

CDEFGHIJKLMNOPQRSTUVWX cdefqhijklmnopqrstuvw #\$%&()*.-./0123456789: see? Colons aren't en) (and parentheses)

his is a new paragraph

f the printer can unde

No one would ever think this sample, produced by the somewhat infamous Epson FX-80, was typed. The letters are dotty, square, and extremely unattractive. The surprise is that they're also very legible. The FX-80 produces much better output in this emphasized mode, which uses horizontal overlapping, than it could with simple double striking. This sample has one unique distinction: It places underlining completely below the descending letters. Although the line touches the bottom of some descenders, it doesn't

obscure a single dot.

### LO-1500

LQ-1500 Epson Ame ica Inc 2780 Lomita Blvd. Torrance, CA 90505 (800) 421-5426 (213) 539-9140 List Price: \$1,295

Pins in Head: 24 datrix Size: 9×23 Draft Speed: 93 cps NLQ Speed: 49 cps Ratings Preferred: 3 Acceptable: 6

Barely Acceptable: 0 Unacceptable: 0 Total Points: 21 [Reviewed in Volume 3 Number 23, page 229.] CDEFGHIJKLMNOPORSTUVWX cdefghijklmnopgratuvwx

****&()*,-./0123456789: Colons aren't

hen) (and parentheses

This is a new paragrap! If the printer can unde Epson's new LQ-1500 printer was judged one of the best in the survey. The letters might not look like those coming out of any familiar typewriter, but they're just as fully formed and extremely readable. Epson made good use of the printhead's 24 pins. This model's under-

lining is placed closer to the letters' descenders than the Epson FX-80's, but those letters are just as legible, thanks to their detailing. The lowercase g, for example, is beautifully rounded, and couldn't be mistaken for any other letter.

CIRCLE 194 ON READER SERVICE CARD

### OSP-125

OSP-125 Florida Data Corpora 600D John Rodes Blvd. Melbourne, FL 32935 (305) 259-4700 List Price: \$3.995 Pins in Head: 8 Matrix Size: 24×36

Draft Speed: 600 cps NLO Speed: 150 cps [Numbers not tested by PC Magazine] Preferred: 4

Acceptable: 4 Barely Acceptable: 0 Unacceptable: 1 Total Points: 20

Florida Data OSP-130 reviewed in Volume 3 Number 23, page 243.] CRCLE 863 ON READER SERVICE CARD

BCDEFGHIJKLMNOPORSTUVWO bcdefghiiklmnopgrstuvw *# \$ \$ & 1 () *+. -. /012345676 Colons aren't

n) (and parentheses). This is a new paragraph

If the printer can unde

This was the most expensive printer in the survey-and you can see why. Its characters don't look like they're made of dots; they seem to have come straight out of a Selectric. The letters are almost too solid and dark, though. This sample might have received more Preferred ratings if it had been printed with a less inksaturated ribbon. The only problem is that some descenders and commas are partially obscured when underlined. The OSP-125 stands out as a rugged, heavyduty printer with claims to a much faster near-letter-quality speed than any other printer in the survey.

### Microline 92

Microline 92 ta Corpori 532 Fellowship Rd. Mt. Laurel, NJ 08054 (800) OKI-DATA (609) 235-2600

List Price: \$499 Pins in Head: 9 Matrix Size: 9×9 Draft Speed: 90.9 cps NLQ Speed: 30 cps table: 5 Barely Acceptable 2

Total Pointer 15 [Reviewed in Volume 3 Number 23, page 164.]

CIRCLE 1992 ON READER SERVICE CARD

CDEFGHIJKLNNOPORSTUVWX ocdefghijklanopgratuvwa #\$%&^() *+,-./012345678 entence uses a colon:

semi-colon (and a hyr This is a new paragraph

the printer can

This printer's characters are fully formed but unattractive. The letters a, e, s, and especially m are heavy, and underlined descenders are a problem. Okidata supplied samples produced on its Microline 84, Microline 93, and Pacemark 2410 printers. All these used a virtually identical typeface and received comparable ratings of 16, 14, and 15 points, respectively.

### **DMP 2100P**

DMP 2100P Radio Shack **Tandy Corporation** 300 One Tandy Center

Fort Worth, TX 76102 (817) 390-3700 List Price: \$1,495 Pins in Head: 24 Matrix Size: 24×36

Draft Speed: 160 cps NLQ Speed: 100 cps ers not tested by PC Me 12 cpi

Preferred: Acceptable: Barely Acceptable: BCDEFGH1JKLMNOPQRSTUVWXYZ[\

bbcdefghiiklmnoparstuvwxvz *#\$%&'()*+,-,/0123456789::< aren't enough; this uses a

eses).

This is a new paragraph.

10 срі

0

ž

6

10

If the printer can underlin

The DMP 2100P is Radio Shack's topof-the-line, 24-pin dot matrix printer. Its printhead is made by Toshiba, manufacturer of another printer in this survey. Like the Toshiba printer, this machine has no trouble keeping its underlining from obscuring its descenders. The problem is that the Radio Shack printer uses only an Elite character font in which each letter is 1/12-inch wide, unlike the other

printers, which use 1/10-inch-wide Pica fonts. That may not sound like much of a difference in size, but the smaller Elite type is harder to read. Neither font rated

more than a 10-point score.

### CIRCLE 691 ON READER SERVICE CARD

### PT-88

PT-88 ens Infor ation Systems Inc. 5500 Broken Sound Blvd.

Boca Raton, FL 22431 800) JET-TECH List Price: \$745 Pins in Head: 9 Matrix Size: 9×9 (novels)

Draft Speed: 70 4 cps NLQ Speed: 28.3 cps Preferred: 0 Acceptable: 3

Barely Acceptable: 3 Unacceptable: 3 Total Points: 9 IReviewed in Volume 3 Number 23, page 186.1 BCDEFGHIJKLMNOPORSTUVWX bcdefahijklmnoparstuvwx #\$%%" () *+.-./01234567E : see? Colons aren't er

n) (and parentheses). This is a new paragrap! If the printer can unde Under the terms of this survey, this Seimens printer is a bit of a ringer. It doesn't even have a dot matrix printhead-it's an ink jet printer. Instead of tiny hammers that hit an inked ribbon, its printing element uses nine tiny jets to spray individual drops of ink onto the paper. The result is readable, but it doesn't look like it came out of a typewriter. PT-88 produces a perfect imitation of a typical dot matrix printer's output. This isn't the machine you'd want to have printing your finished manuscript, but the ink jet makes it a superior machine for running off rough drafts quickly and quietly.

### CIRCLE 600 ON READER SERVICE CARD

### Gemini 10X

Gemini 10X Star Micronics Inc. 200 Park Ave. New York, NY 10166

(212) 986-6770 List Price: \$399 Pins in Head: 9 Matrix Size: 18×18 Draft Speed: 59.9 cps NLQ Speed: 20.6 cps Preferred: 0

Acceptable: 5 Barely Acceptable: 2 eptable: 2 Total Points: 12

[Reviewed in Volume 3 Number 23, page 145.]

3CDEFGHIJKLMNOPQRSTUVW) ocdefahi iklmnoparstuvw #\$%&' () *+. ~. /012345678 s another, using single Colons aren't enou (and parentheses)! This is a new paragraph

the printer can underl:

The characters the Gemini 10X produces are very square, much like those of the Epson FX-80. Only the stunted lowercase i looks unorthodox. On this sample page, the dot-formed letters appear to be unusually solid and filled in, thanks to the use of a heavily inked ribbon.

### NEAR LETTER OUALITY

### Radix 10X

Padis 10Y Star Micronics Inc. 200 Park Ave. New York, NY 10166 (212) 986-6770 List Price: \$849 Pins in Head: 9

Matrix Size: 18×18 Draft Speed: 88.5 cps NLQ Speed: 27.4 cms Preferred: 1 Acceptable: 2 Barely Acceptable: 5 Unacceptable: 1

Total Points: 12 (Reviewed in Volume 3 Number 23, page 200.) BCDEFGHIJKLMNOPORSTUVU bcdefahi.iklmnoparstuvw

"#\$%&'()*+.-./012345678 another, using single

e? Colons aren't enou (and parentheses)! his is a new paragraph he printer can underl:

This more expensive Star Micronics printer has a prettier character set that's less dotty and more fully formed. The u, v, and w are perhaps too similar. The biggest problem is the line used for underlining: It's unusually thick with clearly visible serrations.

### CIRCLE 686 ON READER SERVICE CARD

### TI 855

TI 855 Texas Instruments Inc. P.O. Roy 1444 Houston, TX 77251 (900) 527 2500 List Price; \$935 without tractor Pins in Head; 9 Matrix Size: 18×32 Draft Speed: 101.6 cps NLO Speed: 15.3 cps Preferred: 3

Unacceptable: 0 Total Points: 20 [Reviewed in Volume 3 Number 23, page 197.] BCDEFGH LJKL MNOPORSTUVWX bcdefahi ikimnoparstuvw "#\$%&"() "+ - - . /012345678 Colons aren' hyphen) (and parenthe

his is a new paragraph f the printer can unde

The TI 855 is the only machine in the survey that offers different typefaces through plug-in font cartridges. Each of the cartridges, priced at \$40, produces draft- and correspondence-quality versions of its font. The sample was printed in TI's correspondence-quality Gothic font. The sans serif letters are thin, with no frills, but are extremely readable and fully formed. The characters' thinness makes words seem to be spaced far apart. an effect that looks a little odd but makes the text easy to read. The descenders stand out fairly well even when they meet the underlining.

### CIRCLE 685 ON READER SERVICE CARD

### Toshiba 1340

Acceptable: 5

Barely Acceptable: |

Toshiba 1340 Toshiba America Inc. 2441 Michelle Dr. Tustin, CA 92680 (714) 730-5000 List Price: \$799 Pins in Head: 24 Matrix Size: 24×24 Draft Speed: 78.4 cps NLO Speed: 40.1 cps

Ratings Preferred: 4 Acceptable: 4 Barely Acceptable: 0 Unacceptable: I

Total Points: 20 [Reviewed in Volume 3 Number 23, page 188.]

CIRCLE 604 ON READER SERVICE CARD

3CDEFGHIJKLMNOPQRSTUVWX ocdefghijklmnopgrstuvw "#\$%&!()*+.-./012345678 see? Colons aren't e

(and parentheses). this is a new paragraph

f the printer can unde

The Toshiba's letters are beautiful, fully formed, and extremely typewriterlike. In fact, when I described this survey to some friends, I showed them Toshiba's sample. Several of them said, "OK, that's what a daisy wheel printer does. Now let me see some dot matrix output." The Toshiba tied for second place in the survey, but I'll admit that it's my personal favorite. The underlined descenders cost the 1340 its only unacceptable rating, given by an editor who was consistently unforgiving on that point. (The editors gave the Toshiba's sans serif typeface sample 19 points.

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nections and the thousands and thounections and the thousands and thousands of PC is BIM mainfarme and
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order or all a form information, and into the state of th

Few things are more frustrating than sitting down with a giant printout of all the corporate data you ever wanted to see and realizing that you still don't have any information. The numbers by themselves have no meaning, properly interpreted, however, they could reveal a great

sampling are of paramount importance.

Statisticians also calculate correlations between business actions and outcomes. Closely related to correlation is regression analysis. For instance, given a series of advertising expenditures and resultant sales, the business statistician

# Turning Data into Information

deal. Moreover, as reports travel up the corporate pyramid, they usually must contain fewer raw numbers and more conclusions and recommendations. The raw data must be meaningfully consolidated and interpreted by the time it reaches the person who will make the final decision. It is the business statistician's job to find meaningful patterns in what appear to be mute and random facts.

One such type of information the statistician looks for is called the secular trend—the changes in sales, production, prices, and so forth over an extended period of time. The secular trend is ofcompass periodic changes over the course of a year or less), eyelical variations (which are changes over more than a year, generally due to business cycles), and random variations. From a series of seemingly erraft in monthly sales reports, series of seemingly erraft in monthly sales reports, use of overall variety changes in leads the picture of overall variety changes.

Marketing surveys or polling are also subject to statistical analysis. Since surveys can never come close to taking account of an entire population, statistical inference is used to generalize the limited sample to the population. The precision of the final results and the statistical error of the

can determine the relationship between the two, project the quantity of sales for a particular level of advertising, and pinpoint an optimum amount of advertising expenditure.

### Doing It on Micros

Statistical analysis involves lengthy summations, exponents, and logarithms. All this mathematics makes the field a natural arena for computers; statistical analysis programs have been available on mainframes for years. More recenttions are supported to the properties of the mainframe products to the FC or writing new PC cal analysis programs are STATA, by Compating, Resource Center, and STICS: Statyraphic. Both programs calculate means, standard de-

viations, correlation coefficients, and singlevariable and multivariable regressions, and can display scatterplots. However, each programbles a very different approach. FSTAP uses a command line, while Statgraphics is menu-driven. STAPA offers fewer perpared functions, but if you know statistics you can build any function you like. Statgraphics gives you don't actuyou like. Statgraphics gives you don't actually need to know statistics to use it successfully.

Using different approaches to interpreting business data, two statistical analysis programs—STATA and Statgraphics—help you make sense out of numerical chaos.

But you will get fuller use of Statgraphics if you know APL, the statistics-oriented programming language.

To compare the programs' execution times for various procedures, I used an ASCII file containing 100 lines of ten random numbers each. The procedural test involved importing this data into each program as ten variables of 100 numbers, saving it as another file in the program's own format, doing correlations among all ten sets of 100 numbers to display a 10 by 10 correlation matrix, and exiting the program's

gram.

The first and second speed tests measure the calculation times for a 10 by 10 correlation matrix and a multivariate linear regression respectively, while the third

### Statgraphics gives you an enormous number of

### canned procedures, so you don't actually need to know statistics to use it.

speed test clocks the time required to display a scatter plot on two of the ten variables. All three speed tests were run both with and without the 8087 math coprocessor (see barchart results).

### STATA

In its early versions, CRC's STATA was entirely command driven and used a simple teletypelike display of information. The current version comes with an optional menu module that can be activated by the F10 key. The menu module displays full-screen lists of the commands. Selecting one of these commands with the cursor keys brings up a data-entry screen, which in turn requests operands and options. When you have entered the data, the screen zips back to the normal command level, with the completed instruction displayed just as if you had typed it. As you become more familiar with STATA, you can avoid the menus and type in the commands yourself.

Since it arrays data in columns, STATA looks like a spreadsheet, but it isn't intended to be used like one. STATA does not retain formulas the way that a spreadsheet does, so changing the values of some of

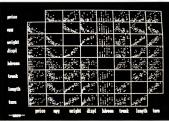


Figure 1: STATA/Graphics divides the screen into a 64 separate graphs showing the scatter plot correlation of every combination of up to 8 variables.

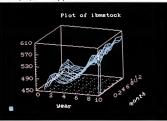


Figure 2: Statgraphics includes numerous graphing and plotting options, including the threedimensional surface plot shown above.

the data does not change any other vari-

The STATA commands allow you to type in columns of data or import data from ASCII files, label the data, merge it with other data, and edit and sort it. You can also generate additional data with STA-TA's formulas. The SUMMARIZE command calculates means, standard devi-

ations, variances, minimums, maximums, skewness and kurtosis, and percentile distributions. TABULATE handles the frequency and percentage summaries, and the CORRELATE command calculates a correlation matrix.

REGRESS calculates linear multivariate regression coefficients, standard errors, t-statistics, an ANOVA table, the F- statistic YES, and R-squared statistics. Although the calculated regression is linear, REGRESS can easily calculate polynomial regressions by simply generating additional variables. For example, if you have two variables x and y and wish to fit y to a cubic polynomial of x, you would enter the following three STATA commands:

```
GENERATE XSQUARED = X^2
GENERATE XCUBED = X^3
REGRESS Y X XSQUARED XCUBED
```

STATA stores internal values for the constant, the coefficients, and the predicted values of y based on the formula approximation. You can then use these values in other formulas.

If you have too many commands to enter, you can combine them in a STATA macro. You can also create entire DO files, which are ASCII files of keystroke commands that can be executed by STATA in an automated batchlike mode.

```
GENERATE YPRED = _PRED
PLOT Y YPRED X, CONNECT (.1)
```

The real tour de force of the STATA of Orgophics system is the scatter plot matrix of up to eight variables (see Figure 1). STATA/Graphic-can divide the screen display into a maximum of 64 separate (but some stating the scatter plot correlation of overy combination of the eight variables. This is an excellent way to start off an analysis of every combination of the eight variables. This is an excellent way to start off an analysis of every servers show you which variables seem to be correlated and which seem to be correlated and which seem to be entirely independent.

STATA did the procedural test with just four statements (the first two lines below appear on-screen as one line):

INFILE VARO-VAR9 USING RANDOM.ASC SAVE RANDOM.DTA CORRELATE

EXIT

The entire process took about 1½ minutes using the 8087 math coprocessor, with file importing (INFILE) taking the most time. Notice the shorthand method in the INFILE statement, which creates ten variables called VAR0, VAR1, VAR2, and so forth. The actual calculation time of

the correlation was 5 seconds.

To run the speed tests, we used a double-precision data type rather than a floating-point type to more closely approximate the precision in Stargraphics.

Cackulation of the 10 by 10 correlation matrix took 5 seconds with the 8087, while the multivariate repression took 6 seconds.

The scatter plot required 4 seconds to display.

### STSC's Statgraphics

Statgraphics, written in APL, was created by the Statistical Graphics Corporation. It is sold by STSC, a company well known for bringing APL to mainframes as

### Glossary of Some Basic Statistical Terms

There's no easy road to statistics, but a brief summary of basic terms can help guide you through the maze.

ANOVA: (Analysis of Variance.) A technique in which the total variation of a set of data is assumed to be influenced by different causes; the variation due to each cause is separated from the total variation and measured. An ANOVA table is a summary of the calculations needed for this process.

Box-and-whiskers plot: A graph that displays the range of the central 50 percent of the data as a box with a line through it representing the median. Lines extending from the box show the range of the data in the lower and upper quartiles. Any data values that extend past the box more than 1½ times the length of the box are shown as separate values.

Histogram: Generally a bar graph, on which the x-axis is divided into ranges of data values. The y-axis shows the frequency or percentage of the total number of samples for each range.

Least-squares: A method of regression in which a formula is derived by minimizing the squares of the differences between the actual data values and the formula approximation.

Normal distribution: A distribution of values taking on a symmetric bellshaped curve centered on a mean that equals the median. About 68 percent of

the distribution is within  $\pm 1$  standard deviation from the mean. The standard normal distribution has a mean of 0 and a standard deviation of 1.

Regression: An anlysis that cxpresses a dependent variable as the result of a formula approximation involving one or more independent variables. (see correlation and least-squares). Linear regression fits a straight line between two variables. Polysomial regression fits a oplysomial. Multivariate (or multiple) regression can express a variable as 100tor of the control of the control of the production of the control of the control and the control of the control

Scatter plot: A graph in which the correlation between variables is illustrated by dots (or sometimes connected dots) with a variable along each axis (also called an x-y graph).

Standard deviation: The square root of the variance. Variance: A measure of the disper-

sion of a set of data around the mean. It is calculated by summing the squares of the differences between each value and the mean, then dividing by the number of values. A larger variance indicates a greater dispersion of values. well as to the PC.

Statisticians and actuaries have long recognized APL as the programming language designed for their specific needs. Just think of Statgraphics as a menu-driven system for accessing a large library of APL functions that encompass statistical analyses, numerical analyses, smoothing, forecasting, time series analysis, plotting, and graphing, and you'll get the general idea. It's as if somebody took the standard textbook on statistics and numerical methods and wrote an APL function for every three pages.

If, for instance, you'd like to do a Kruskal-Wallis one-way variance analysis by ranks or a Holt linear exponential smoothing or a Gauss 32-point numerical quadrature, there they are, right on the menu. So are many other math functions, such as prime number generation, the fast Fourier transform, matrix multiplication and inversion, solving simultaneous equations, and random number generation.

The quantity of menu selections is simply astonishing and frankly overwhelming. The main menu has 22 items divided these brings up a submenu containing 3 to 15 items for a grand total of 175 different functions. The manual is more than 650 pages long and structured much like the

menu system. Numerous graphing and plotting options are also available, including two- and three-dimensional scatter plots, surface plots (see Figure 2), contour plots, boxand-whiskers plots, two- and three-dimensional histograms, and normal bar and pie

You can use many of the APL primiamong six categories. Selecting one of tives (in their text rather than symbol for-

### Putting Your Company on the Map

Mapping geographical data—whether on your color/graphics display, printer, or plotter—is easy with Atlas AMP.

In statistical analysis, a graph is often the picture that's worth a thousand formulas. But when the data you're analyzing must be broken down geographically, you need a special type of graph: a map that displays the data with crosshatched or colored patterns. You've seen

cles. Now the Atlas AMP (Advanced Mapping Package) from Strategic Locations Planning can let you perform this feat yourself using your PC color/graphics display, your printer, and your

plotter. Atlas AMP works with two types of files. The first is a boundary file. A U.S. such maps in books and magazine arti-1976 Per-Capita State Taxes Paid

Figure A: Atlas AMP features include dividing data into interval groups, assigning each group a cross-hatch pattern or color, and displaying a data legend.

state map boundary file, for instance, contains coordinate outlines of all 50 states identified by state name. The second file is a data file that has the numeric data you wish to analyze, also identified by state name. The Atlas AMP program divides this data into interval groups, assigns each group a unique cross-hatch pattern or color, and displays the map with a data legend (see Figure A).

That's the basic method, but you have lots of options. You can select the hatch patterns, dot densities, and colors. You can divide the data into nondefault ranges, based either on evenly spaced ranges or an equal number of regions within each range, or by setting the ranges manually. (The program provides some basic statistical information, such as the mean, the standard deviation, and the median, to assist you in this.) A zoom option can shrink the map or focus in on a portion of it. You can add titles to the maps, print them on an IBM Graphics Printer or compatible with Shift-PrtSc. or plot them on an IBM. Hewlett-Packard. or compatible plotter.

Atlas AMP can accept data in ASCII or DIF file format. The manual shows how BASIC, dBASE II, or 1-2-3 can be used to prepare data for the Atlas program. For instance, if you'd like to analyze your market penetration by state, you could set up a 1-2-3 worksheet with your sales by state, the population of each state, and the ratio. You'd save it. convert it to a DIF file within 1-2-3, and then read it into Atlas AMP along with the U.S. boundary file. If you're lucky, mat) in formulas for creating new variables. For those menu items that create data, you can save the data in a variable and use it later in other formulas.

Of even greater significance to users of STSC's APL*PLUS language package is that you can access many of the Statgraphics functions from your own APL programs, including those for plotting. Conversely, you can use your APL functions from within Statgraphics if your APL-

*PLUS program is Version 4.0 or later. Stateraphics can import ASCII, DIF. and 1-2-3 files. This import process is ac-

tually a conversion to Statgraphics's own filetype. To use the converted variables, you must access them with the read function. Importing an ASCII file is particularly problematic. You must either specify the file as unformatted, in which case all the data is put into the same variable, or formatted, in which case you must specify the start and end columns of all the fields.

### Testing Statgraphics

APL is not known for its file I/O, and the speed of Statgraphics suffers as a result. This slowness is vividly demonstrat-

petite for more detailed maps, a breakdown of the San Francisco area by fivedigit ZIP code is also included.

Although theoretically you could design your own boundary files in ASCII format, it would be a difficult job. Anticipating your needs, Strategic Locations Planning has many more boundary files and data files available at extra cost. The other boundary files contain breakdowns by county, census tract, advertising region, congressional district, as well as three-digit and five-digit ZIP code areas. You can rack up quite a bill for these files. For instance, a boundary file containing all U.S. counties and three-digit ZIP code areas costs \$900. Data files with census information are also available for population statistics, income distributions, and age distributions, as well

as education and occupation statistics. The different versions of Atlas are a bit confusing, Atlas AMP, Version 1.0, is a superset of Atlas (without the AMP) Version 2.0, which is an undate of Atlas (no AMP), Version 1.0, Atlas 2.0 costs \$100 less than Atlas AMP 1.0 but leaves out some features, including a map slideshow program. You can upgrade to the AMP version by paying the \$100 differ-

Strategic Locations Planning specializes in geographic data and analysis for marketing and strategic purposes. Aside from the Atlas series and related programs, they offer consulting services, customized mapping, and data downloading to PC diskette format from your mainframe tapes.—Charles Petzold

ed by the procedural test, which took more than 10 minutes with the 8087 chip. Although the actual correlation calculation took only 19 seconds, it takes Statgraphics about 50 seconds just to get to the main menu. Every menu selection seems to cause the program to make a disk access to bring in some code.

Users of APL also know how slow its processing can be, and this program isn't exempt. Calculating the 10 by 10 correlation matrix took 19 seconds with the 8087 chip, and the multivariate linear regression required a whopping 115 seconds. The display of the scatter plot was completed in 26 seconds.

What these times do not reveal is the program's frequent disk access when going from one function to another. You'll spend a lot of time with Stateraphics staring at the screen with your chin resting in your hands. If you are using Statgraphics from floppies rather than from a hard disk. you'll probably come close to junking the entire program.

### A Final Correlation . . .

STATA is significantly faster at calculating than is Statgraphics, as might be expected when comparing a compiled C program with a largely interpreted APL

STATA Professional, Version t.3: STATA/Graphics Add-On Module Computing Resource Center 10801 National Blvd. Los Angeles, CA 90064

(213) 470-4341 List Price: STATA Professional, \$395; STATA/Graphics Add-On Module, \$195

Requires: DOS 2.x. 256K RAM, one disk drive. graphics adapter and display for STATA/Graphics. Supports 8087 math coprocessor CIRCLE 700 ON READER SERVICE CARD



Statgraphics, Version 1.0 STSC Inc. 2115 E. Jefferson St Rockville, MD 20852 (301) 984-5000 List Price: \$695 Requires: tBM PC, XT, AT or compatible; 384K RAM; DOS 2.x: two disk drives (hard disk

and display. (Supports 8087 math coprocessor.) CIRCLE 699 ON READER SERVICE CARD

the geographic patterns of strong and weak sales will jump right out at you.

Arlas is function-key-driven and comes with a key template for the main features. Pressing a function key usually brings up a short one-line menu. Some parts of the program allow selecting ontions by moving the cursor keys. While the program certainly doesn't have a slick user interface and takes some getting used to, the manual contains a good tutorial that walks you through the procedures

The program seems cranky at times (particularly if you're new to it) and beeps a lot, sometimes indicating an error, sometimes just to signal that it's done with what you wanted. It could use an improved menu-driven interface.

The boundary files determine the types of maps you can use to display the data. Atlas AMP comes with boundary files with state breakdowns in 48-state. 50-state, and regional (north, south, east, and west) formats. Just to whet your ap-



4030 Moorpark Ave., #123 San lose CA 95117 (408) 985-7400 List Price; \$449 (additional boundary and data files available

at extra cost) Regulres: 192K RAM, DOS 2.0 or later, two disk drives (hard disk recommended); IBM color/graphics adapter and display (or compatible), or Plantortics ColorPhus CIRCLE 686 ON READER SERVICE CARD

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I'm interested. But first, I'd like to review your demo disk and print samples. Enclo
is \$5 for a complete Evaluation Kit.

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160

### BUSINESS STATISTICS

program. STATA's speed makes it a useful program for people who need to perform relatively simple analyses on large quantities of data already in ASCII format. The program can accommodate almost 250,000 single-precision floating-point numbers on a 640f-byte machine and really files during calculations, particularly with an 8807 cropocessor. To do more advanced analyses, you will probably need to enter formulas manually with a excellook

nearby.

The Statgraphics package unquestionably has more features and is both more flexible and more versatile than 5747A, particularly if you know and work with APL, as most statisticians do. In fact, this package might be worthwhile for APL-PLUS users just as a treasure chest of APL functions. The program's main drawbacks are its slow speed and bulk

### . . And Some Statistical Forecasting

To a certain extent, statistical analysis programs, common for many years on mainframe systems, have been upstaged on PCs by powerful spreadsheet programs. In theory, little in PC statistical analysis programs could not be done in a spreadsheet package providing you have the right formulas. The main drawback is

that the quantity of intermediate results needed for some of the calculations adds a lot of bulk in a spreadsheet.

A valuable next step for a PC-based statistical analysis package would be to break away from the mainframe style of com-

Statgraphics has more features and is both more flexible and more versatile than STATA, particularly if

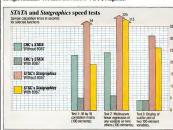
### you work with APL, as most statisticians do.

mand/response interface and design PC software that integrates the necessary functions into a spreadsheet type of organiza-

ton.

If and when that happens, here's how
the future might look: You'll select
@CORR from a 1-2-3-like menu and be
prompted for the two data ranges you want
to use. The program will ask you for the
destination of the result, and presto! There

Charles Petzold is a frequent contributor to PC Magazine.



As the above bar shows, STATA is significantly faster at calculating than is the more complex package, Statgraphics.

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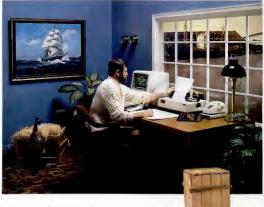
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# Multiple Approaches



# To Multiuser Database Management

TEAM-UP smoothes the way for novices. PICK is an old favorite whose concepts serve as the base for the newer Network Revelation.

ultiuser database management programs are making their preskeplace, Despite some of their common 
goals, as a group they present a fractured 
image, with many disparate facets. Approach, user interface, case of use, cost, 
hardware requirements—many aspects of

these programs differ. Even the ages of the programs vary widely. Of the three programs reviewed here—PICK, Network Revelation, and TEAM-UP—the oldest, PICK, has over 40,000 installations, while the youngest, TEAM-UP, is just out of beta testing, with less than 150 installed systems.

The PICK system for the IBM PC is also the least expensive of the three packages reviewed. And you don't have to shoulder the additional expense of network software, NIC cards, or a file server. To use the program to its fullest potential, you just hook two dumb terminats to the serial ports of a standard 256K-byte PC-XT.

PICK is not for the casual user, though,

Network Revelation, a program designed for both advanced and casual users, brings the concepts of the PICK operating system into the DOS environment and is geared toward larger sites. The most expensive of the three packages, Revelation also has the most features and power. TEAM-UP is a straightforward, goodlooking performer in the middle of the price range. Designed for the less technically competent user, however, TEAM-UP may frustrate programmers since it never allows the user to take control.

This review looks at TEAM-UP first. since it is the newest on the market, then PICK-the oldest-and finally the impressive Network Revelation, which is built on the PICK system.



TEAM-UP, Version 1.1 Unlimited Processing Inc 8382 Baymeadows Rd., #8 Jacksonville, FL 32216 (904) 731,8330 List Price: Single-user system. \$795; multiuser

system (LAN), \$1.795 Requires: 256K RAM; IBM PC-XT or compatible for version reviewed.

### CIRCLE 657 ON READER SERVICE CARD



PICK Systems 1691 Browning Irvine, CA 92714 (714) 261-7425 List Price: Three-user system (not a LAN), \$495 Requires: 256K RAM: IBM PC-XT or con

CIRCLE 656 ON READER SERVICE CARD

Network Revelation, Release G

CIRCLE BYS ON READER SERVICE CARD

COSMOS Inc 19530 Pacific Hwy, South Seattle, WA 98188 (206) 824-9942 List Price: Single user, \$950; 4 mers (LAN) \$1,495; 10 users (LAN). \$3,000: 32 pers (LAN), \$5,000 Requires: 320K RAM; IBM PC. YT AT, and compatibles; math

coprocessor recommended

### TEAM-UP: A Clever Combination

The TEAM-UP package, just released by the company that introduced the IN-FORMA series of products several years ago, is a database manager plus applications generator. With a comprehensive set of menus and formatted screens to shield both the applications programmer and the nontechnical user from the true machine environment, it gives you rapid access to large databases, customized help screens, packaged system-administrator functions, and an easy transition from single-user to multiuser configurations.

The multiuser version of TEAM-UP is available for the following local networks: IBM's PC Network, Microsoft Networks, Novell NetWare, Ungermann-Bass Network One, 3Com EtherSeries, and Tele-Video Infoshare. While many older database management packages are straining to embrace LAN concepts and handle multiuser security requirements, TEAM-UP was designed for that environment and handles it with flair.

First Impressions If appearance counts, TEAM-UP starts at the top of the class. The 300-page tutorial manual and the reference manual, which is twice as long, are bound in heavy burgundy covers with gold-stamped spines; the pages are printed in colored ink on thick, textured cream paper.

Its impressive binding notwithstanding, the lengthy tutorial can be hard to follow. The text has no screen displays; you must sit at your computer to understand it. In addition, with so much blank space on the pages, you can lose your place easily whenever you look up. The reference manual is better formatted but still suffers from the lack of screen displays.

### Installation

Installing the single-user system is a snap. The INSTALL program on the distribution diskettes does the whole job. which takes only a few minutes on a PC-XT. It will even create the subdirectories you need if you haven't already built them. On an all-IBM system, TEAM-UP loads the necessary drivers automatically and provides a reminder to undate the CON-FIG.SYS file for expanded FILES and BUFFERS, since the system can maintain a large number of open files at once.

The final installation steps configure the system for your monitor and printer. A special program called INSTEAM lets you pick four different color schemes (preset combinations) for the IBM color monitor plus TI (mono or color), Wang (mono only), Televideo (925/950/970), Wyse (50/100), and the venerable VT 100 and its look-alikes. The choices on the printer menu are somewhat more limited, offering only the Epson MX, the TI 850, the Okidata 84, the Centronics 351, and the HP LaserJet. If your printer or monitor is not compatible with this short list, you can easily configure your equipment at the escape-se-quence level. Once the software is loaded and the configuration steps are completed. TEAM-UP is ready to run.

### Security

TEAM-UP is designed, from the ground up, to be a machine-independent multiuser system. Unlike many other packages on the market, it can span multinle subdirectories on multiple drives, support individual users with differing security clearance levels, and handle the problems of two or more users working with the same data file

While the sales literature indicates that any single-user application will run "without change" in the multiuser environment. procedural language routines support the LOCK and UNLOCK commands to control how parts of the database are momentarily blocked from updating. The vendor claims that the database can't be corrupted by more than one terminal updating the same record at the same time, but the reference manual indicates that the automatic locking function can be bypassed by any procedure that contains the UNLOCK command. (This user-dependent control is common in modern packages but somewhat at odds with the sales pitch.)

### Running Smoothly

The TEAM-UP Data Manager is completely menu driven, with more than 30 menus in its "tree." When running an application, the system moves smoothly from function to function and in many cases "remembers" the application name and status, making subsequent choices unnecessary. Experienced users can race

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through the menu tree by using "dot pathing" effectively bypassing the intermediate menus once the tree has been committed to memory.

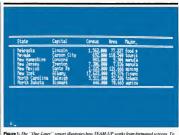
Unlike so many systems that depend on syntax-driven command lines, FEAM-UP always works from formatted screens. To retrieve records, you simply fill in enough of the data fields to identify the desired item. If more than one record matches, the system displays a screen of "one-linest" from which you select the correct record (see Figure 1).

Entering, updating, and decking records are just as easy. To enter a new record, fill in the blank form on the screen, then press Chri-E forest the screen mode to "enter" status first). Index updating is automatic and fast. If you aren't careful, the Tab and Return keys can quickly get you in trouble, hough. Unlike systems that use a special keystroke to file, delete, you can be command function when you for the work of your press Tab. Forget just once a you press Tab. Forget just once the partial record will be entered into the database before you finish building it.

The designated systems administrator can control the TEAM-UP environment completely. You can apply security at the application, menu, function, file, and field levels, thus permitting a large network structure with controlled access.

Report generation, also handled from formated display screens, takes some getting used to. Although some users may be more comfortable with using a free-form command line for this function, TEAM-UP's consistent forms-driven approach works well. You control the multistep process of designing reports from a menu with 16 exits, which may be a little intrimidating if all you want is a list of your top salespeople or an overdue shipping report

A separate "application maintenance" ment supports such housekerping chores as enlarging files, reindexing, reorganizing, removing audit trail images, and extering an obsolete applications segment. Two slick additional features give you a "show status" biliboard, which shows the administrator a snapshot of the application, and a "copy application" function, which lets you duplicate a system under a different name.



regains 1: Inc. One-Lineer report insistroies flow LEAM-UP works from formatted screens. In or retriever records, enough of the data fields or elifled in to identify the desired them. If more than record matches, TEAM-UP displays o screen of "one-liners" from which the correct record is selected.

The "enlarge files" function can surprise you. The files TEAM-UP supports are defined in size, and if you try to enter a record when the file is full, you ratempt is aborted with a system message telling you to enlarge the file space. The process isn't difficult, but it does take a few minutes. A future release of the system that could handle file growth without manual intervention would be welcome.

TEAM-UP includes some niet touches for the novice user. If you blunder into the maintenance menu when all is well, it will remind you that no maintenance flientines are required. The package supplies a procedural language and includes a nudimentary text office to support the entry of a program or substontine. TEAM-UP promotional materials promise enhancements to the editor in future releases, although each continue of the cont

A new product just emerging from extensive and expensive R&D, the language is powerful enough for most applications, but I find it stiff and stilted. I did not expect a procedural syntax requiring that each command end in a semicolon, a length limitation of 10 characters on a literal string, or the need to use: as an assignment operator, when just = is good enough. A full-blown accounting system (presumably written in this language), available for \$1,795 for single-user and \$4,495 for multisuer setups, should prove an adequate test of the completeness of the language.

An IMPORT module is packaged as an option but does not appear separately on the price list. This menu-driven processor handles import/export functions, and it will work with TEAM-UP databases, flat ASCII files, and DIF files. Don't buy TEAM-UP without it. Why do things the hard way?

A complex software product like TEAM-UP is only as good as the service available from the vendor. TEAM-UP gives you 30 days of hotline technical support, from a local number in Jacksonville, Florida. For continuing service you pay \$250 per year for toll-free access supplied

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For so new a product TEAM-UP shows tremendous polish. A simple, straightforward database manager and applications generator that's easy to learn, completely packaged in an unbreakable menus shell environment, and comfortable in both singleuser and multiuser configurations. TEAM-UP looks and acts like a winner for the novice user and nonprogramment.

### PICK: Still Picking Up Points

The PICK system for the IBM PC disfers from TEAM-UP and Network Desired Tools from the Newlation in several significant ways besides its lower price and more advanced age. A non-DoS product, it requires a separate and disk partition, and it's a true multisuer system that supports up to three concurrent terminals all hocked to a single PC-XT. No LAN configuration is involved. You just stick a pair of serial prior into your XT. have a full-blown three-user "iminiormater system" (uniform provider vision).

The PICK package includes five diskettes, backed up by a slipcased manual with over 600 pages of computer-printed documentation that has been photorduced to the familiar 5- by 8-inch format. Where TEAM-UP's manuals suffer from an over flashy design and far too much white space, the PICK manual suffers from the opposite. After an hour or so of reading it, you end up with severe eyestrain.

### Familiar Territory

When I installed the software in a 5-megabye disk partition (a minimum of 3 megabyes is needed), it was just lite rolling back the clock. I've used PICK systems since the early 1970s, starting with the original implementation on a Microdata Reality, and I saw it all happening again on the XT monitor. If you're a PICK programmer, you really don't even need to read the manual to use this system. It hasn't chained.

That's both the good news and the bad. Although the PICK operating system, as implemented on a number of minicomputers and mainframes, but had 10 years of the property of the

blocked. This is not progress.

A true PICK system supports virtual memory management and treats all the available hard disk space as an extension

# The PICK system does not include an application builder or screen

generator; you're on your own with very few tools at your disposal.

of main memory. This package does that and bears all the other marks of PICK systems everywhere—total inability to recognize a higher-level operating system IDOS, to read or write DOS-accessible files, to import/export data from/to a DOS-formatted diskete, and to execute or pass data to other PC packages like spread-sheets or word processors.

On the plus side, the package supports the PICK spooler (a very impressive multi-function print queuing subsystem) and provides true multiuser functionality (three users maximum) on a standard PC-XT with only 256K bytes of RAM.

From a cost/performance point of view, PICK can give you a functioning three-terminal configuration with a shared printer for the price of one PC-XT, two dumb terminals, a printer, and this one 5495 software package. A LAN setup and its associated social hardware, cabling, and rather

expensive software just can't match that.
What you give up is access to the rest of
the software goodies that make life so
much nicer. You can't integrate your data
with your spreadsheet program, and your
end user cannot use his favorite word processor without switching back to the DOS

partition and leaving the entire PICK application behind.

You're isolated from DOS completely. The package uses the diskette drive in licu of the magnetic tape unit that's always part of a PICK mitincomputer system. When of a PICK mitincomputer system. When the the tape drive. To your user process, what you really get is drive At. This drive is used for the FILE-SAVE procedure (PICK's version of a backup), a diskette that has been written by this package cannot be read or duplicated by any known DOS when the program. The old standity because, as do all the others tired.

The PICK package is clearly intended to be used primarily by technical programmers. When you boot up, no fancy banners or graphic displays greet you, Instead you get a very annoying 2- to 3-minute pause while the operating system verifies itself, followed by a system prompt character. (If followed by a system prompt character, or with the control of the prompt character, or the date and into a force the other and the prompt character. (If the prompt character is the date and into set area host or the date and times teach host or the date and times teach host.)

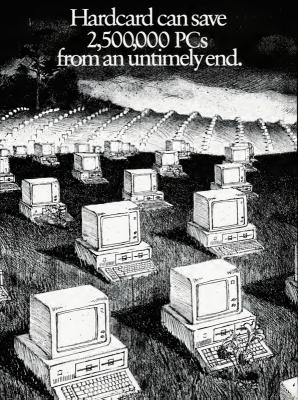
### Languages and Processors

The system does not include any type of an applications builder or screen generator, and so you're on your own with very few tools at your disposal. You do get a line editor (but no full-screen operations of any kind—emember, the cursor keys of disabled) and the RUNOFF document processor that was used to print the manual that comes with the soltware. To develop running applications, you use the standard library of PICK languages and processors:

TCL: A comprehensive and powerful set of one-liner commands executed from the system prompt level. The other system processors are all invoked through TCL commands. I/O devices, the spooler, and the BASIC compiler are all supported.

EDITOR: The original twin-buffered line editor used in all PICK implementations as the standard method to enter programs and other text items. It can also access data records and control items. Everything is accomplished in teletype mode, one line at a time.

PROC: An interpreter that accepts a simple batch language file keyed in via the editor. It contains primitive logic and branching capacitities and cut be asset to





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construct relatively complex sets of batch functions. You just type the name of the PROC item at the system prompt, and the command sequence is executed immediately. Since TCL commands cannot be executed directly from the BASIC programs, PROC gives you an alternative method of triggering TCL-level functions.

BASIC: A very mature file-oriented BASIC compiler, with untyped variables, dynamic and dimensioned array processing, excellent file manipulation capabilties with record locking, statement labels without line numbering, multiple statements per line, structured logic, and capality to handle strings up to 32M policy, and capability to handle strings up to 32M policy and size. The most serious lack is a facility to excent operating-system functions from course togething-system functions from able would permit PROC to be dropped from the system considerly.

ACCESS: The PICK ropot generate what appears in other implementations under names like ENGLISH and RECALL. The input is made from the system prompt as a sentence with strict rules of grammar and syntax. Primarily used as a listing process, it also supports sorting and set selection prior to report output generation prior to report output generation. Use of this report writer requires a lot more know-how than the full-screen inquiryty-port features of TEAM-UP, which is at the opposite end of the user interface spec-spoule end of the user interface spec-

RUNOFF: An output-formatting document processor that uses embedded "dot commands" to control print-time formatting of the text. Normally you must entire the text to be printed with the line editor, and you do not see the data in its formatted state until it his the printer. The processor builds tables of contents and handles the typical chapter/section/subsection formating of most reports. It was obviously used to print the manual.

### Some Good Points

Although PICK hasn't changed with the times—if tacks graphics, word processing, screen builders, applications genentors, and that all-important DOS interface—it's still a fine piece of software that ports to the PC-XT a functionally complete version of the PICK operating system. It runs on less hardware and costs a lot less than TEAM-UP and Revelation, and it 1

provides true multiuser operations through dumb terminals attached to the serial ports of an XT.

### Network Revelation: Expanding One's Scope

The last package reviewed here—the latest release of Network Revelation comes in first in terms of performance and fickshility. Revelation makes PICK look old and tattered. And while TEAM-UP would be finistrating for the advanced programmer to use. Revelation is well-suited to both advanced and casual users. It's a complexity current PICK implementation advantage of the operating environment and hardware features and peacefully cocessits with DOS.

With this release Revelation incorporates LAN requirements and other expanded capabilities. Users of the previous release can purchase an upgrade diskette (\$50) or a complete replacement including

the new documentation (\$100). The documentation is in three volumes: a user manual, a technical reference manual, and a separate spiral-bound tutorial for the first-time user. The new manuals are by far superior to those of TEAM-UP and PICK. The material is typeset and highly leavible, with excellent screen displays. The ntorial manual takes the new user through the process of installing the intruspit the process of installing the intruspit the process of installing the ductory course in Revelation concentrating particularly on the applications generator tools found in RDEAD and the RALIST report generator. Many of the basic concepts will be foreign to you have had no prior exposure to the PICK operating system. Protrusaged the material is paced well so that you're not overwhelmed at the outset.

The software has grown also and now comes on three dischetes. The application builder is a menu-driven series of processor that wells you through all the segre of creating an application. You initiate each action—including file creation, dictionary development, screen layout, program log-cir, report generation, and internal documentation—from the I/D/ESIGN master menu, and the system leads you from one process to the next automatically (see Figure 2).

### Enhanced Functionality

This release of Revelation expands the capabilities of R/DESIGN to better link multiple screens and incorporate subroutines written in BASIC where needed for added processing or editing power. The major change is the addition of the Alter-



runs on less hardware and costs a lot less than TEAM-UP and Revelation, and it applications builder uses to create applications.

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nate Filing Systems. Revelation previousply supported a single method of filing that grouped data in 64K "frames" on disk and in memory. This structure (ROS format) is efficient for very small files and local databases, but it is definitely inapportate for a file that is to be shared on a network. The new file structure, called LINK, is specifically designed for large database files and shared data files.

ROS files are stored on disk as individual DOS files. No one file may exceed 64K. LINK files are preallocated at file creation time as single DOS file presized to hold the anticipated records that will be louded. ROS files are read and written all at once, 64K at a time, while a LINK file is handled in It Kd and frames. Revelation includes a utility command that will recreate addata file in the now formar, thus simplifying the conversion of existing large files from ROS to LINK.

Record locking is incorporated in the product and is automatically invoked by processors like the system editors, the COPY command, and portions of R/DE-SIGN. When you're programming in R/BASIC, the LOCK and UNLOCK com-

mands are available. These features, coupled with network operating-system senaphores, cause re-cond-level locking that will permit shared access to a database without loss or corruption of data as long as the conventions are observed. COSMOS recommends that designers use the network conventions all the time, since they are completely harmless in the single-user version of the system, which simply genores them during provided the state of the size of the system, which simply genores them during provides access to the size of the

cause network version will support a uniber of network configurations under the Novell NetWare Operating System (2004) NetWare Operating System (Schwie Wie NetWare Operating System (NetWare ID), Novell Star (Novell NetWare ID), Novell NetWare (Novell Net Ware ID), Novell NetWare (Novell NetWare ID), Novell NetWare (Novell NetWar

PC-Network, Nestar Plan 3000/4000, or products from Banyan Systems or Santa Clara Systems.

### Other Improvements

Communication with all this external hardware and software, whether a Novell Star system, an ARCNET hookup using token-passing in a string of stars, or a simple single trunk with twisted-pair cabling, is almost invisible to the user. Three commands have been added to the language:

Network Revelation gives you the best of both worlds: snappy creation of standard applications from the built-in generator system, or enough raw programming

power to build whatever you need. Whether you are a casual user or a programmer, it will meet your multiuser database

management needs for features and power.

LOCK, UNLOCK, and RECREATE-FILE. One command has been modified: CREATE-FILE has been extended to offer the option to make ROS or LINK files. This level of environment independence, comparable to that provided by TEAM-UP, is welcome since the product is already installed in a wide base, and COS-MOS had to retrofit the network interface to an existing product.

The R&D staff worked on more than entworking in this new release. They've enhanced R/BASIC to include user-defined functions and to support need Common, a feature taken from the grand-daddy of all programming languages FORTRAN. New commands let the program open, read, and write any DOS file directly, Interface to the interactive debugger has been improved, and several new functions are now available.

A lot of effort was directed at the R/DE-

SIGN applications builder. The designer now has better window handling, contextsensitive help, more flexible calls to subroutines, an expanded menu processor, and a myriad of other improvements.

### BASIC Power

The real strength of Revelation still lies in the powerful implementation of BA-SIC. COSMOS has retained virtually all the features of the original PICK System DATABASIC and also has included the ability to execute any DOS command from within the program. You can format diskettes, perform BACKUP and RESTORE functions, and invoke your word processor or other applications program directly. The serious applications developer can build systems that run in a controlled manner. You can make the system as tight as with TEAM-UP for the novice user, or you can provide exits to various levels of DOS based on a user's security clearance. You can use this facility to give newcomers to the system explanatory screens instead of an empty command line. Ad Hoc Inquiry-selecting records from multiple items with the same name or key-is easily handled by small Revelation programs tailored to client requirements.

The programming facility is powerful enough to permit the development of custom generators, designed to support the production of specialized software for tical articles. Written entirely in RPBA-SIC, this system—which goes far beyond the limits of R/DESIGN coding—allows a functional analyst to describe requirements and get back operational software.

Network Revelation gives you the best of both words: snappy creation of standard applications from the built-in generator system, or enough raw programming power to build whatever you need. Although Revelation is more expensive than TEAM-UP and PICK, if is worth every extra dollar, since it lets you do so more. Whether you're a casual user or a programmer, it will meet your needs for features and power.

John R. Phillips is technical director of Five Technologies, a professional-services consulting firm specializing in human resources, located in Woodcliff Lake, New Jersey.

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# Buffers that Boost Communications To supprise that communications is

Potential

The Prometheus ProModem and the Hayes Transet 1000 are communications buffers with different designs and intentions. It's no surprise that communications is becoming an important space of computer use. Moderns are nearly as wide-spread as printers, and the desktop computer and the telephone are evolving into a single instrument. Not unexpectedly, the nature of computer communications is also evolving. One singressing outgrowth is the communications buffer.

At the risk of oversimplifying, a buffer

### Prometheus ProModem 1200

Prometheus Products Inc. P.O. Box 4156 Fremont, CA 94539 (415) 490-2370 List Price: ProModem 12

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List Price: ProModem 1200 (without buffer), \$495;

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RAM), \$99; 512K Buffer (with 4K CMOS

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display, \$99, Additional memory provided by

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modem \$32.95

Norcross, GA 30092 (404) 449-879] LISI Price: Transet 1000, \$399; accessory kit for IBM PC, (which contains configuration program and cable), \$39.95; cable for Transet to parallel printer, \$32.95; cable for Transet to Parallel can be described as a chunk of memory designed to hold information that is ultimateby headed elsewhere. A printer buffer sits between a computer and a printer, allowing you to send a file from computer to buffer memory faster than most printers can print. It sends the file to the printer at whatever speed the printer can handle.

freeing the computer for other tasks.

A communications buffer serves much the same function. Since a communications buffer sits between the computer and a modern, it has a wider range of possible functions, simply because a modern—and the buffer attached to it—can work in both

directions.

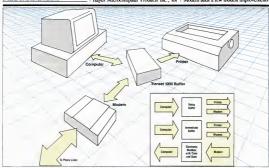
Different manufacturers have opted for different approaches, and just because two devices are both called communications buffers doesn't mean they have much in common. The communications buffers sold by Prometheus Products Inc., and by Haves Microcomputer Products Inc., for

example, show little overlap in design and a vast difference in capabilities.

#### The Prometheus ProModem 1200

The Prometties to Communifications Buffer cones in two versions: the Buffer cones in two versions: the Buffer comes in two versions: the Communications Buffer and the 512 K. Communications Buffer. Despite the names, both buffers come with a minimum 4k bytes of RAM, 64K and 512 K refer to the maximum memory capacity of each buffer. As you might expect, the 512K version is basically an upgrade of the 64K version is basically an upgrade of the 64K buffer. As you further a solitonal memory capacity. El-promethical Production on the Promethical Production 1200.

The base model of the ProModem is a Hayes-compatible, 300/1200 bit-per-second, autodial, autoanswer modem. To the Hayes Smartmodem 1200 command set, the de facto standard for moderns, the Pro-Modem adds a few modest improvements



When you set up the Transet 1000 as a communications buffer, it frees your computer for other work by accepting little at high speed, the foreign can set hold little received from the computer, the need multiple copies of each fit to a printer of lower speeds. The buffer can set hold filler received from the computer, the need multiple copies of each fit to a printer or a modern. As an extra, Transet 1000 holds any incoming electronic mail until you request it. The computer does not need to be not for the buffer to exceed files.

of its own. Where the Smartmodem 1200 dials blind, for example, the ProModem can listen for dial tones and busy signals and can adapt its dialing to the situation.

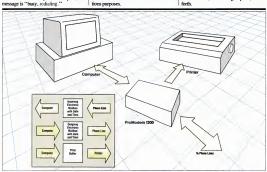
Unless told otherwise, the ProModem will listen for a dial none before dialing. If it doesn't hear one, it will send a "no dial tone" message to your screen and what about the call. If it does hear one, it will begin dialing with tones, then will listen again for a dial tone. If the dial tone is still there, the modem will try again, this time usine pulse dialer.

The ProModem can also detect a ring or abusy signal on the phose line. When dialing a number it will report "dial compress," then "ringing" or "busy," as appropriate. The modem can even tell the difference between a busy number and a busy network path. With a busy number, the consistency will rety in 30 seconds." With a busy network path, the

Some programs may be confused by these additional features, but you can avoid problems by setting the ProModem to use just those dialing features found on the Hayes. This Smartmodem 1200 mode is set through either a keyboard command or a DIP switch. As with the Hayes, a built-in speaker lets you follow the pro-

gress of a call even when dising blind. In addition to its extra smarts in disling the phone, the Probledern has several other commands that men't on the Smartune Commands that men't on the Smartune HELP command, which will put a list of the most commonly used commands with on the sreeen, and the time commands, which will put a list of the most commonly used commands will give modern's clock, the commands will give nodern's clock, the commands will give you the date and time on request. More important, the Problodern's communications offer can read the clock for communications offer can read the clock for communications.

Measuring 11.5 inches deep by 6.5 inches wide by 2.3 inches high, the Pro-Modern is somewhat larger than the Hayes Smartmodern but still small enough to sit conveniently under a desk phone. And the ProModem is stylish enough to make a Smartmodem look unattractively techy by comparison. This chic is partly due to the off-white plastic case that blends in nicely next to a PC. The design is also enhanced by the ProModem's eight status lights (Auto Answer, High Speed, Carrier Detect, Off Hook, Receive Detect, Transmit Detect, Modem Ready, and Terminal Ready). These lights track the same conditions as the eight status lights on the Smartmodern 1200, but they are hidden behind a dark red plastic window that runs across the front panel of the modern and are visible only when they light up. They don't need labels because they display AA for Auto Answer, HS for High Speed, and so



As its name implies, the ProModem 1200 contains the Prometheus buffer and a modem. The Incoming Electronic Malibox rough and hoids incoming messages. The Outgoing Electronic Malibox holds outgoing messages and transmits them at a designated and stime. The Printer Buffer rists your computer go on to other tasks by receiving information at a high speed, then sending it to the printer at a lower speed.

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Control, the unimate strategy game. A gatheso old that no one knows its exact origins. Turbo GameWorks lets you play chess at six different levels from the beginner to the sophisticated user. And you have many ways of playing with your Turbo GameWorks. Let the computer solve checkmate problems. Set the time limit for each game. And there's more.

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in a row—either horizontally, vertically, or
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The red window on the ProModem also hides an optional alphanumeric display. When the modem is siting idle, the display functions as a handy desk clock. While talking to another modem, it shows you how long you've been on-line. When the modem dails the phone, the display spells out essentially the same messages that the modem sends to the computer

One of the advantages of the ProModems large size is that it leaves room for internal expansion. Adding a communications buffer means adding a board, which fits inside the ProModern and sits, piggyback, on top of the modem board.

#### Prometheus 512K Communications Buffer

The modern that Prometheus sent for review already had the communications buffer option installed. You can buy the modern this way, or you can install the buffer yourself. The installation instructions seem straightforward and should not be a problem to anyone who is comfortable

installing an expansion board in a PC.
As al already mentioned, the 512K buffer comes with just under 4K bytes, but
for a buffer comes with just under 4K bytes, but
the numbers actually work out to just under
4K.) While this memory is enough for
buffering short messages, it is not enough
for a full-scale comminications buffer, for
exap the real benefits of a buffer, you can
just buffer to buffer to buffer to buffer to buffer to buffer to
the buffer to buffer to buffer to buffer to buffer to
with the extra memory already installed, or
you can easily buffer the the vourself.

The communications buffer, like the ProModem itself, contains its own onboard smarts in the form of a program written permanently on a ROM chip. This ROM acts as a supplement to the modem's built-in program and adds a few more commands to the modem's command set.

The additional commands for the communications buffer fall into three related categories. The first group helps you craate, maintain, and use a telephone directory. With the base model, using 4K bytes of RAM, you can store roughly 100 entries, complete with name, phone number, logon information, and even macro commands for automatically requesting information from another computer. You can then dial by name or by directory entry number instead of having to remember an entire phone number and log-on sequence.

The commands for the telephone directory will also let you identify groups of phone numbers—all sales reps, for exam-

An important difference between the ProModem's communications buffer and an electronic mail program is the buffer can perform its e-mail function inexpensively, 24 hours a day, without forcing you to dedicate a PC to the task.

ple. You can then give a single command, and the buffer will send the same message to every name in the group.

The dialing directory on the 512K buffer will let you attach a password to either of the first 52 directory entries. You can then use that password to row ways. First, the buffer can ask the caller for idensigning on to the system. The caller gest three tries before the buffer hangs up the phone.) A second level of security also demands identification by name and passments before the second of the second calls back, using the number stored in the phone directory.

A second group of commands lets you send outgoing messages. These let you store messages in the buffer along with instructions telling the modern whom to call and when. Messages can be sent either right away, while you use your computer for something else, or at some specified later time—presumably in the middle of the night, when phone rates are lowest, your computer is turned off, and you're

asleep.
The third category of commands lets
you use the buffer as a mailbox for incoming messages. You can turn the buffer on
or off to determine whether it will answer
the phone or not. Notice that the buffer can
be on and accepting incoming messages to

even while your PC is off or you are using it for something else. Each message is date and time stamped so you will know when it arrived.

Other commands in this category let you read the stored messages or clear them from the buffer. You can save messages to disk by "logging on" to the buffer with a communications program and reading the messages. Simply tell your terminal program to save the incoming information, then save that information to disk.

then save that information to disk. The constellation of features in the Pro-Modem's communications buffer is well suited for electronic mail applications. In fact, the telephone directory and the ability to send and receive messages in unattended mode mimics the capabilities found in many electronic mail programs. The buffer even has a WRU (who are you) answerback feature so it can identify itself in response to a Control-E from the remote

system.

Probably the most important difference between using the ProModem communications buffer and using an electronic mail program is that the ProModem's buffer can perform its e-mail function inexpensively. 24 hours a day, without forcing you to dedicate a PC to the task.

The 512K buffer has its limitations, however. To begin with, the maximum 512K is no match for a hard disk in heavy-dray applications. Second, the ProModen lacks the ability to transfer files using error-checking protocols, which limits it to sending and receiving text messages. Finally, the ProModem is subject to memory loss in a power failure.

The base memory of 4K CMOS RAM cones with battery backup. This battery vour plone distortory in case of a power failure, but it still leaves all your messages—both incoming and outgoing—at risk. Worse, if you have a power failure, you have no way of knowing what messages you didn't send or read—much less how important the ware for were.

This possibility of losing messages is potentially troublesome, but it is not a fatal flaw. Even if you're forced into getting a standby power supply just for the sake of the ProModem's memory, an e-mail system based on the ProModem would still be less excensive than a dedicated PC.

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8-03 am. You're into the spreadshees. Phone rings You kick in SideKack's Noteend-without leaving your spreadsheet. You talk, You listen to Frank, You make notes that tell you that Frank is upping the numbers from yesterday's order and he needs a new price and delivery date He wants a meeting. Fast, but when? You have SideRick fire up your Calendar. Time agreed and noted-in SideKick's NotePad. Conversation ends. Your sereadsheet is

8:07 am You're watching the spreadsheet but you're thinking about the new bid you have to figure out. So you have SideKick's Calculator pulled up on the screen-over a small piece of the spreadsheet-which doesn't go away 8.88 art. SideKick is coming up with new numbers

SuperKey keeps the spreadsheet on a roll. Satisfied with the numbers, you have SideKick auto-dial Frank's number Talk, Talk, Harre up

8:69 avt. Spreadsheet about done. You're watching. it, but thinking about what Frank just said on the phone He liked your numbers. He ordered. He said. "That was fast. We won't need that meeting. (SideKick cancels it from your Calendar). And he also said. How did you get all that done so quickly?" And you said, "I've get a couple of new guas working for me

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#### **Print Buffering**

Another way to use the \$12K buffer is as a printer buffer with a serial printer—it has a serial port and some added commands for that purpose. According to Prometheus, the unit cannot operate as both a printer buffer and a modern at the same time, but it can retain outgoing messages in the buffer while printing.

As a printer buffer, the 512K is somewhat limited. For example, you cannot send it new files while printing. You can print multiple files, however, by sending all the files to the buffer first, then telling

the unit to print them.

The unit's biggest limitation as a printer buffer is simply that it has only a serial port. This port is obviously of no help if you have a parallel printer, which is the most common kind of printer among PC

owners.
Even if you ignore the printer buffer feature, the ProModem 512K Communications Buffer increases the potential uscludess of the ProModem 1200 for a relatively small additional investment. What's more, it offers a workable approach to setting up a small-scale e-mail system. What it does, it does well; the only question is

whether it does everything you need.
The Prometheus 64K Communications
Buffer is the basic product of which the
Prometheus 512K Communications Buffer is an upgrade. In fact, if you have the

64K buffer, you can get an upgrade kit from Prometheus for \$50, which is the difference in price between the two models. Aside from having a more limited capability for memory expansion, the 64K version lacks the printer buffer feature and pass-

The Hayes Transet 1000 was designed to give you maximum ability to use your system for several things at once: It is a standalone unit that can function as a communications buffer

with just about any modem

word security features of the 512K buffer. As of this writing, Prometheus is assuming that the 64K version will be eclipsed by the 512K version. The 64K Buffer version will still be available, however, for the immediate future.

#### Haves Transet 1000

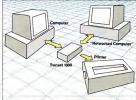
The essential difference between the Prometheus communications buffers and the Hayes Transet is one of intent. The Prometheus buffers are designed around an electronic mail function: The buffer is an integral part of the ProModem 1200, both physically and conceptually, and is meant to extend the ProModem's canabilities.

The Hayes Transet 1000 was designed to give you the maximum ability to use your system for several things at once: It is a standalone unit that can function as a communications buffer with just about any modern. And it is meant to give you the maximum flexibility in its use.

The Hayes Truyes (100) has neither a stephane directory nor an outgoing buffer for storing messages to send later. The Transet does have an incoming communications buffer, or electronic mailbox, for incoming messages, It also has no utgoing buffer in the sense that it can transmit a file through your moder while you use your computer for something else. And it includes a sophisicated printer buffer feainductes are provided to the contraction of t

The Transet can serve any of three significantly different functions. It can be seed as a coordination communications buffer and printer buffer, connecting a sinsle computer to both a printer and a modern. It can be used strictly as a printer buffer, connecting two printers to one computer, Finally, it can serve as a kind of poor man's network, connecting two computers to a single printer and to each other.





his diagram illustrates two other likely configurations for the Transet 1000 buffer. Acting as a printer buffer (left), the Transet can end files from your computer to either of two printers. As a poor man's network (right), it can transfer files between the two omputers. The network also allows either computer to access the printer.



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#### A Summary of Features

	Hayes Transet	Prometheus 64K Buffer	Prometheus 512K Buffer
Memory	128K nonexpand- able memory	4K to 64K RAM	4K to 512K RAM
Configuration	Standalone unit will work with most auto- dial/autoanswer modems	Optional add-on for Prometheus ProModern 1200	Optional add-on for Prometheus ProModern 1200
Outgoing communicationa buffer	Buffers outgoing messages but will not hold messages for unattended operations	Buffers outgoing messages and can hold messages for timed delivery	Buffers outgoing messages and can hold messages for timed delivery
Phona book	None	Unlimited. Holds roughly 100 names and phone numbers with 4K memory. Can also designate groups of numbers.	Unlimited. Holds roughly 100 names and phone numbers with 4K memory. Can also designate groups of numbers.
incoming communications buffer	Automatically date- and time-stamps in- coming messages	Automatically date- and time-stamps in- coming messages	Automatically date- and time-stamps in- coming messages
Error-checking protocol	Xmodem	None	None
Security features	No individual pass- words, but uses dif- ferent passwords for leaving messages and for reading them	None	Up to 52 individual passwords can be set for either pass- word protection or with cell-back
Battery backup	None	First 4K only	First 4K only
Printer buffer	Can attach parallel or serial printer. Print buffer works concur- rently with commu- nications buffer	None	Can attach serial printer only. Com- munications buffer can hold outgoing messages while printing but cannot

The three Transet functions are similar, but they are still different enough in concept and in application to cause confusion unless you approach each one separately.

Probably the most likely application for Transet is as a communications buffer and printer buffer. At least this is what Hayes assumes, and the unit comes already set for that configuration.

The Transet looks very much like the Hayes Smartmodem and uses the same metal case. If you have a Smartmodem you won't need extra desk space: You can put the Transet directly on or underneal your modem. The Transet's front panel is also similar to the Smartmodem's, with eight labeled status lights. It has three jush

switches for control. And like the Smartmodem, the Transet has an external power supply that plugs into the back of the unit. Inside the box is a nonexpandable 128K-RAM buffer and an M68008 microprocessor with 32K bytes of ROM holding the on-board programming.

The installation procedure with Transet is easy enough, assuming you star with the proper accessory kit and cables. The accessory kit, which costs \$39.95, includes a menu-driven configuration program and a 9-foot cable for connecting the Transet to the PC. You'll also need two your modern and one to connect the Transet to your modern and one to connect it to your printer.

The Transet's back panel has three ports: P1 is a combination serial/parallel output port for a printer, S1 is a bidirectional serial port for your modern; and S2 is a bidirectional serial port for your computer. Each of the Transet ports uses a different connector. If you have the proper cables, installation is simply a matter of plugging in cables wherever they fit. Unfortunately, the standard cables you probably already have for printer and modem do not use the same connectors that you'll find on the Transet. Haves offers appropriate cables for a suggested list price of \$32.95 each. This is no bargain, but you're not likely to do much better elsewhere, unless you can put the cables together yourself. (Haves provides cabling information in the back of the manual.) As shipped, the Transet is configured

for a Hayes Smartmodem 1200 or compatible and either a serial or parallel printer. If you have any other modem (including a Smartmodem 300 or Smartmodem 2400), you'll have to tell the Transet about it by stepping through the menus of the configunation program.

Some of the choices on the menus, such as "character format," involve arcane communications settings that are not explained very well in the manual. Fortunately, you can ignore these choices and simply follow the manual's step-by-step instructions. If you accidentally change the wrong setting, you can return to the factory defaults by hitting the spacebar. Changes in configuration are written to a FPROM (Electronically Enzashle Programable Read Only Memory) in the Transet.

With cables and power supply plugged in and with the Transet configured for the right modem, it is basically installed. There are two other considerations, however. First, you will have to set your modem so Transet can control it—usually by resetting DIP switches. Be forewarded that you may have to experiment a bit if you're using anything other than a Smartmodem.

Second, you will need to set your serial port to 9600 baud so you can talk to the Transet at top speed. Hayes supplies a batch file on the installation disk to do this setting. The manual explains how to add the commands to your AUTOEXEC.BAT

file.

When installed this way, the Transe



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MultiLink Advanced¹⁶ & PC-Shadow⁵⁶ are trademarks of The Software Link, Inc. wakes up as a combination printer buffer and incoming communications buffer. The printer buffer lets you load a word processor or other application and print a file as usual. The only difference you'll notice is that your computer will finish "printing" long before your printer is done.

The communications buffer capability means someone can call and leave a message in your mailbox while you are using the computer for something else, or even when the computer is off. A status light on the Transet blinks to tell you there is a message in your mailbox. A built-in clock/calendar time- and date-stamps each mes-

The two buffers can work concurrently. If someone calls while the Transet is printing from the printer buffer, the unit will still answer the phone and take a message. And if you really want to be impressed by what the Transet can do, try using your computer to write a letter while the printer buffer is printing a report and the comments.

nications buffer is receiving a message.

The printer buffer can also perform a few other useful tricks. For example, once you've sent a file to the Transet, you can print multiple copies by "replaying" the file as many times as you like (up to 255 times). The command is given through the

buttons on the front panel.
You can also print one file through the
Transet's "immediate buffer" while the
Transet holds another file for later replay in
the replay buffer. And you can add files to
the replay buffer using the front-panel con-

trols, or put multiple files in a print queue.

The communications buffer also has a few features worth special note. The buffer includes password protection, using a different password for leaving messages and for reading them. You can give out a phone number and password for leaving messages and still be reasonably sure that you're the only one who can read your mail.

Because you can sign on to the buffer and your mail from a remote computer, you can set up the unit in one location and read your mail from another. Or, you can leave a report in your Transet for someone else to pick up.

Reading your Transet messages from home base is not very different from using a remote computer. The Transet configuration program includes a "talker," a simple terminal program that will let you perform such operations as signing on to the Transet, reading your mail, and saving the messages to disk. Transet itself presents a menu for printing and erasing messages and for moving forward or backward through your messages.

You can also use just about any terminal program to sign on to the Transet locally. The only complication in this procedure is that you have to use the front-panel buttons to inform the Transet that you want to talk to the mailbox.

One last, important feature of the communications buffer is that it can receive files using the Xmodem protocol. This protocol lets you receive program files and

# Probably the most likely application for the Hayes

Transet 1000 is as a communications buffer and a printer buffer.

8-bit data files as well as text files. You can then save the files to disk—also using Xmodem—either with the Hayes talker or with the communications program of your choice.

#### Other Transet Configurations

When using the Transet without a modem, you use the configuration program to set the unit up as a printer buffer rather than a communications buffer. This distinction is not just semantic. If you choose the printer buffer option, the configuration program actually reconfigures the Transet, wiping out the mailbox buffer and changing the Transet's data paths as well as the meaning of the status lights on the front

panel.

An example might help here: When configured as a communications buffer, a status light B indicates that your computer, on port \$S_c\$ is connected to the Timset's mailton. But when configured as print buffer, light B indicates that your computer or no port \$S_c\$ connected to either aprinter or another computer—whichever device happens to be connected to print \$S_c\$.

The point is that the physical path for the data has changed.

When using the Transet with one computer and two printers—presumably a draft quality printer and letter quality print-—you have option to see their printer at will for any given document, or print we different documents immittaneously, or print the same document on both printers at one. And, of course, you can continue to use, your computer for other tasks while the printing is active. The frontel switches determine what files go where and when.

If you want to use the Transet with two printers, however, keep in mind that the unit has two serial ports and only one serial/parallel port. At least one of your printers must have a serial port.

When using the Transet with two computers and one printer, you can send files from either computer, or you can send files from one computer to the other. In this configuration, Transet will automatically queue up to 63 printer jobs—or up to its

full 128K bytes of RAM.

You can also use just the Transet and a modem as a standalone electronic mailbox. This configuration would not give you the complete email system that the ProModem 1200 offers, but thanks to the Transet's password protection it could serve as a convenient, reasonably secure mail drop, or even as a dedicated, low-security bulletin board.

As with the ProModem, this mail drop would suffer from the lack of battery backup, but you could add a standby power supply, or simply a printer to automatically orint messages as they came in.

Clearly, the Hayes Transet 1000 and the Prometheus Communications Buffers are not directly competitive products. More important, neither one is even close to being the last word in communications buffers.

An ideal communications buffer would have both the full outgoing - mail features of the ProModem Buffer and the concurrency and printer buffer features of the Transet 1000, and would add a battery backup as well. Given that you can't yet get all these features prepackaged in one unit, the choice of what to buy depends on which features you need more.

M. David Stone is a regular contributor to PC Magazine.

# THE CASE OF THE DISAPPEARING CABLES





Here's a puzzle for you, Watson! Look at this new MicroManager!

Can't say I see anything out of the ordi nary, Holmes,

Think, Watson, not about what you see, but rather what you don't see.

But, Holmes, everything seems perfectly in order, Precisely! When did you ever see a printer station that was perfectly

in order, Watson?

Zounds, Holmes! Some rascal has stolen the cables! So it seems, Watson, but observe carefully-there's more to this than meets the eye. The cables have been cleverly concealed right under our very noses! Notice how each cable disappears through a knock-out hole and enters a channel in the rear of the device. Remove these out hote and—voila!—we discover the cables passing from level to level through secret compartments.

Holmes, you've solved the Case of the Disappearing Cables!

Elementary, my dear Watson. But the MicroManager has solved an even deeper mystery—where to put the printer! See how this Basic Floor Unit is actually composed of individual sections—'modules,' Americans call them. Consider the possibilities, Watson—single modules used as desktop printer or monitor stands, for keyboard storage, or what-have-you. Combined, they can form any sort of work station we need! The base has locking casters for instant mobility. There's even an optional paper refolding attachment! Cunning, isn't it?

By Jove, Holmes, this new MicroManager is the most diabolically

clever device we've ever encountered! Indeed, Watson, Thank MICCOCOMPUTER Heaven its creators are

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# PEEKing at Your PC's Memory

If you're hungry for direct control of your PC, then this first installment of a two-part series on POKE, PEEK, INP, and OUT statements ought to satisfy your appetite.

ould you like to know the next number that will be generated by BASIC's random number generator?
Would you like to know the date 1,000 days from now? Would you like to determine which of your printers is on-line? Or have six palettes at your disposal in medium-resolution graphics mode instead of the normal two?

These and many more tasks are easily accomplished by PEEKing (looking into a memory location), POKEing (placing a number into a memory location), NNPing (reading a number from a port), or OUT/ing (sending a number to a port). This article attempts to give a thorough documentation of the varied soot of these statements. The presentation attended for every soot of the statements. The presentation attended for every explanations are in BASIC, most of the information is applicable to every programming language.

#### A Word of Caution

PEEKs, POKEs, INPs, and OUTs reveal the inner working of the computer and thus give the programmer direct control. IBM discourages the use of PEEK, POKE, INP, and OUT, however, since the company cannot guarantee that future releases of DOS or future ROM chips will see the current memory locations. Also, ports associated with nonstandard hardware might furnicion in different ways. To be safe, widely distributed features.

On the other hand, IBM has been quite consistent so far. Most of the memory locations and ports presented in this article hold for all existing versions of DOS and BASIC. Of course, this might change with some future release. But in the meantime, I say, enjoy the control.

#### Memory

The letter K represents the number 1024. Therefore, 64K is actually 65536, and K*K is 1048576. Theoretically, the IBM PC can directly address 1048576 memory locations, numbered from 0 through 1048575. Normally, a maximum of 640K locations.

tions of RAM (random access memory) is available for user programs. The remainder consists of ROM (read-only memory) or is otherwise reserved for present or future system applica-

A segment is a 64K portion of memory beginning at a location that is a multiple of 16. Segment 0 consists of memory locations 0,1,2,3,...,65535. Segment 1 consists of memory locations 16,17,18,...,65551. Segment 2 consists of memory locations 23,33,4,...,65567. In general, then, segment m consists of memory locations 16*m, 16*m+1, 16*m+5535.

Within each segment, the first memory location is said to have affert 0, the second memory location is at offset 1, and so forth; the last memory location is said to have an offset of 65535. Memory locations are specified by giving a segment that contains the location, together with the offset of that location within the segment. Most memory locations can thus be specified in many ways. For instance, the designations "segment looffset 34", "segment 1 offset 18", and "segment ment looffset 34", "segment 1 offset 18", and "segment for 100 per 100 per

#### **Before You Start**

Before entering and executing any of the PEEK and POKE statements in this article, be sure this statement is executed first:

DEF SEG = Ø

PC Mogazine tried the PEEKs and POKEs in this article on standard IBM equipment, and they worked flawlessly, However, since they bypass many built-in safeguards to work directly with your system's memory, playing to with them carelessly or on non-IBM equipment is like playing with fire, so type them in carefully, observe the proper DEF SEG, and don't try any variations unless you know what you're doing.

2:offset 2" actually refer to the same memory location.

Each memory location holds a number from 0 to 255. These numbers are often called bytes. In BASIC (either in immediate mode or in a program), to read the number in the memory location segment m:offset n, you execute

The DEF SEG statement specifies the mth segment as the current segment, and the value of PEEK(n) is the number contained in the memory location of offset r in the current segment. In a similar way, to insert the number r into the memory location segment m-offset n, you execute

This POKE statement places the number r into the memory location of offset n in the mth segment.

#### D----

Ports
The PC's microprocessor receives data from and sends data to the various components of the computer through what are called ports. There are ports associated with the keyboard, the

data consists of a number from 0 to 255, and each port has a number assigned to it. The value of the function INP(n) is the value of the byte read from port n. The statement OUT n, m sends byte m to port n.

The listings presented here (the first of a two-part series) deal with memory locations in segment 0, which is often referred to as low memory. The program LOMEMRY BAS, shown in Figure 1, illustrates many of the applications presented here. Subsequent sections will deal with BASIC's data segment, the monochrome display, color monitors, and read-only memory.

#### Low Memory

Two important procedural considerations must be stressed if you intend—as many readers will—to enter the listings from the keyboard to try them out. First, the statement

should be executed before the PEEK and POKE statements in this section are executed. (Future sections will use other DEF SEGs, such as DEF SEG=&HB800 for color monitor tricks, and DEF SEG=&HB000 for mono.) Second, to prevent a Syntax Error message, remember to two PRINT before each of the

```
disk drives, the speaker, and the screen, for example, A byte of
    18 'LOMEMRY. BAS by David I. Schneider
    20 DEP SEG=0
    30 CLS: KEY OFF: LOCATE .. 0
    40 DEFINT I:I=0
    50 PCS="Press any letter to continue."
    70 'Hardware
    89 '
    90 PRINT "This computer has: ": PRINT
    100 R=PEEK (1843) +256*PEEK (1844)
    110 PRINT 1024*R; bytes of RAM."
    120 M = PEEK(1040) AND 48
    138 PRINT (PEEK(1848) AND 1) * (1+PEEK(1848) \64); "diskette drive(s)."
    138 PRINT (PERKISS) AND 13 (1-FERRISS) 043) - DIRECTE GIVE(8).-
148 PRINT (PERKISS) AND 12)/64; "printer adapter(s).-
158 PRINT (PERKISS) AND 14)/2; "RS232 Card(s).-
158 PRINT (PERKISS) AND 14)/2; "RS232 Card(s).-
178 PRINT: PRINT "This monitor is a ", MS
188 LOCATE 24,6 PRINT PC; WHELLE INKETS-"* HEND:CLS
    190
    280 ' Date
    210
    220 D$=DATE$ 'record today's date
    230 PRINT "Today's date is ", D$
    246 PRINT
    258 FOR I=1 TO 1888
    268 POKE 1136,1:A$=DATE$
    288 PRINT "The date in 1888 days will be ";DATE$
298 DATE$-D$ 'restore the proper date
    300 LOCATE 24.6:PRINT PCS::WHILE INKEYS="":WEND:CLS
    316
                                                                                                       (Pieure I confi
    320 ' Speaker
```

 $\textbf{Figure 1:} The LOMEMRY. BAS \ program \ shown \ here \ illustrates \ many \ of \ the \ applications \ discussed \ in \ this \ article.$ 

```
(Figure I continued)
330 "
340 PRINT "The key of C in several octaves."
350 OUT 97, INP(97) OR 3 'turn speaker on
360 F=65.65625
                  'frequency of a low C
370 FOR I= 1 TO 5
380 OUT 67,182 'prepare to send value to timer chip
398 A=INT(11931821/F):H=INT(A/256):L=A-H*256
400 OUT 66, L:OUT 66, H
410 FOR J= 1 TO 1000:NEXT J
428 F=2*F
430 NEXT I
448 OUT 97, INP(97) AND 252 'turn speaker off
450 LOCATE 24,6:PRINT PC$;:WHILE INKEY$= "":WEND:CLS
468
470 ' Toggle Caps Lock state
488 1
490 PRINT "Type any letter without pressing a shift key. "
500 PRINT
510 L$=INPUT$(1):PRINT L$:PRINT
528 POKE 1847, PEEK (1847) XOR 64
                                    'toggle the Caps Lock state
530 PRINT "Type the same letter again.";
540 PRINT "It will now have a different case."
550 L$=INPUT$(1):PRINT :PRINT L$
568 LOCATE 24,7:PRINT PC$;:WHILE INKEY$= " : WEND:CLS
578
580 ' Disable and reenable keyboard
598 1
600 OUT 97, INP(97) OR 128 'disable keyboard (PC or XT only) 610 PRINT "The keyboard is disabled. Press some keys."
620 FOR I=1 TO 3000:PRINT INKEYS;: NEXT I:PRINT:BEEP
638 OUT 97, INP(97) AND 127 'reenable keyboard
640 PRINT "The keyboard has been reenabled. Press some keys. ";
650 FOR I=1 TO 3000:PRINT INKEY$;:NEXT I:PRINT:PRINT:PRINT:BEEP
                 'disable keyboard interrupts
660 OUT 33,130
678 PRINT "The keyboard interrupts are disabled. Press some keys.";
680 FOR I=1 TO 3000:PRINT INKEYS;:NEXT I:PRINT:PRINT:BEEP 'use 5000 for AT
698 OUT 33,128 'reenable keyboard interrupts
700 PRINT "The keyboard interrupts have been reenabled.":
710 PRINT "The letters you just typed are:
720 FOR I=1 TO 20:PRINT INKEYS;:NEXT I:PRINT
730 LOCATE 24,7:PRINT PC$;:WHILE INKEY$="":WEND:CLS
748
750 ' Turn on diskette drive motor for three seconds
760 1
770 POKE 1088,55
780 OUT 1010,28 '2"(ASC("A")-61)+ASC("A")-53 = 28
798 PRINT "Diskette drive A will be on for three seconds."
800 LOCATE 24,7:PRINT PC$;:WHILE INKEY$="":WEND:CLS
810 '
828 ' Stuff the keyboard buffer with GOTO 918 + CHR$(13)
830
848 POKE 1050,30
850 POKE 1052,48 ' 30 + 2*(LEN("GOTO 910"+CHR$(13)) = 48
860 POKE 1054,ASC("G"):POKE 1056,ASC("O"):POKE 1058,ASC("T")
870 POKE 1060,ASC("O"):POKE 1064,ASC("9")
880 POKE 1066, ASC("1"): POKE 1068, ASC("0")
                                                                             (Figure I continues)
```

```
(Figure I continued)
898 POKE 1878.13 'Carriage return has ASCII value 13
900 LIST 810-830
910 PRINT: PRINT "The LIST command terminated the program."
920 PRINT "Then the contents of the keyboard buffer'
930 PRINT "caused execution to resume at line 910."
948 LOCATE 24,7:PRINT PC$;:WHILE INKEY$="":WEND:CLS
958
960 ' Keyboard status
978 '
980 PRINT "
                      Caps Lock state:
990 PRINT "
                       Num Lock state:"
1000 PRINT "
                           Insert state:"
1010 PRINT "
               Caps Lock key pressed:
1020 PRINT "
                 Num Lock key pressed: "
1036 PRINT Ins key pressed:"
1046 PRINT "Scroll Lock key pressed:"
1050 PRINT "
                       Alt key pressed:"
1060 PRINT
                      Ctrl key pressed:
1070 PRINT " Left shift key pressed:"
1080 PRINT "Right shift key pressed:"
1898 LOCATE 28,7:PRINT "Press some of the keys mentioned above."
1100 LOCATE 23,7:PRINT "Press Ctrl/Break to terminate program.";
1110 X=PEEK(1047):Y=PEEK(1048)
1120 IF (X AND 64)=64 THEN S$(0)="Uppercase" ELSE S$(0)="Lowercase" 1130 IF (X AND 32)=32 THEN S$(1)="On" ELSE S$(1)="Off"
1148 IF (X AND 128)=128 THEN S$(2)="On " ELSE S$(2)="Off"
1150 IF (Y AND 64)=64 THEN S$(3)="Yes" ELSE S$(3)="NO
1160 IF (Y AND 32)=32 THEN S$(4)="Yes" ELSE S$(4)="NO
1170 IF (Y AND 128)=128 THEN S$(5)="Yes" ELSE S$(5)="No "
1180 IF (Y AND 16)=16 THEN SS(6)="Yes" ELSE SS(6)="No "
1190 IF (X AND 8) =8 THEN S$(7) ="Yes" ELSE S$(7) ="No
1200 IF (X AND 4) =4 THEN S$(8) = "Yes" ELSE S$(8) = "No
1210 IF (X AND 2)=2 THEN S$(9)="Yes" ELSE S$(9)="No"
1220 IF (X AND 1)=1 THEN S$(10)="Yes" ELSE S$(10)="No"
1230 FOR I=0 TO 10:LOCATE I+1,30:PRINT S$(I):NEXT
1248 GOTO 1118
                                                                                  (Figure 1 ends)
```

PEEK statements, so the result will be displayed on the screen. Beginners should also know that as they are used here, the words AND and OR in these listings are logical operators and do not mean "the sum of" or "an alternative to."

#### A. Keyboard

1. The following statements are used to set or to determine the status of the keyboard toggle keys.

#### CapsLock key

PEEK (1047) AND 64

has a value of 0 if the keyboard is in lowercase mode and a value of 64 if the uppercase mode is active. To specify lowercase

POKE 1047, PEEK(1047) AND 191

To specify uppercase

POKE 1047. PEEK(1047) OR 64

To toggle between upper and lowercase

POKE 1047, PEEK(1047) XOR 64 The statement

PEEK(1048) AND 64

has a value of 64 if the key is pressed, 0 otherwise.

#### NumLock key The statement

PEEK(1047) AND 32

has a 0 value in the cursor-control mode and a value of 32 for the numeric-keypad state.

To specify the cursor-control state,

POKE 1047, PEEK(1047) AND 223

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#### PEEKS AND POKES

To specify the numeric-keypad state,

POKE 1047, PEEK(1047) OR 32

To toggle between states,

POKE 1047, PEEK(1047) XOR 32

The statement

PEEK(1048) AND 32

has a value of 32 if the key is pressed and a value of 0 otherwise.

#### Ins key

The statement

PEEK(1047) AND 128

has a value of 128 for the insert state, 0 otherwise.

To specify the insert mode,

POKE 1047, PEEK(1047) OR 128

To specify noninsert mode,

POKE 1047, PEEK(1047) AND 127

To toggle the state,

POKE 1047. PREK(1047) XOR 128

The statement

PEEK(1048) AND 128

has a value of 128 if the key is pressed and a 0 value otherwise.

#### ScrollLock key

The statement

PEEK(1047) AND 16

has a value of 16 when scroll-lock is on and a value of 0 otherwise.

To specify the scroll-lock state,

POKE 1047. PEEK(1047) OR 16

To specify the alternate state,

POKE 1047, PEEK(1047) AND 239

To toggle states,

POKE 1047, PEEK(1047) XOR 16

TORE IPTI, I BERLIEFI / NOR .

The statement

PEEK(1048) AND 16

has a value of 16 if the key is pressed and a value of 0 otherwise.

2. The following statements test the status of some special keys.

The statement

PEEK(1047) AND 8

has a value of 8 if the Alt key is pressed and a value of 0 other-

wice

The statement

PEEK(1047) AND 4

· man(epri) min

has a value of 4 if the Ctrl key is pressed, 0 otherwise.

The statement

....

PEEK(1047) AND 2

has a value of 2 if the left Shift key is pressed and a value of 0 otherwise.

The statement

PEEK(1047) AND 3

has a value of 1 if the right Shift key is pressed and a 0 value otherwise.

The statement

PEEK(1047) AND 3

has a value of 0 if neither shift key is pressed.

The statement

PEEK(1048) AND 4

has a value of 4 if the Sys Req key is pressed; otherwise its value is 0 (PC AT only).

3. In the numeric keypad state, the character with an ASCII value n can be displayed on the screen by holding down the Alt key, typing the number n on the numeric keypad (not the top row!), and then releasing the Alt key. PEEK (1049) has a value of n from the time the number is typed until the Alt key is released.

4. The circular keyboard buffer begins at location PEEK (1959) + 1924 and ends (possibly after cycling back to location 1954) at location PEEK (1952) + 1923. Ordinary characters use every other location. Extended characters use two locations, the first location containing the null character (CHRS(0)). The statement

POKE 1050, PEEK(1052)

clears the keyboard buffer.

The contents of the buffer can be read by PEEK without first being removed from the buffer. Further, characters can be POKEd into the buffer to ensure the continuation of a program even if a program-terminating statement is executed. For instance, if the string

"GOTO 99"+CHR\$(13)

is POKEd into the buffer and a LIST command is executed, the program will continue execution at line 99 after the LISTing has been completed, which overcomes BASIC's annoying habit of stopping dead after certain operations.

5. With PCs whose motherboard can hold 256K bytes of RAM, the keyboard buffer can be assigned a different location and length. The following program places the beginning of the keyboard buffer at memory location 1024+B and gives it the capacity of holding L characters.

# Put your \selection slave to work now!



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Number One

Number One. And built like it. 10 DEF SEG=0:H=INT(B/256) 20 POKE 1152,B-H*256:POKE 1153,H 30 T=B+2*5L+2:H=INT(T/256) 40 POKE 1154,T-H*256:POKE 1155,H

58 POKE 1858, PEEK(1152): POKE 1851, PEEK(1153)
68 POKE 1852, PEEK(1152): POKE 1853, PEEK(1153)

The buffer contents always begin at

PEEK(1050) + 256*PEEK(1051) + 1024 and end (possibly after eyeling back from location 1085 to loca-

tion 1024+B) at location PEEK (1052) +256*PEEK (1053) +1024

You must use care in choosing B and L: Two possibilities are B=144, L<55 and B=301, L<233.

To disable Ctrl-Break, enter

FOR I=Ø TO 3:POKE(1Ø8+I), PEEK(112+I):NEXT I
Note: Before disabling Ctrl-Break, use PEEK to record the

Note: Before disabling Ctrl-Break, use PEEK to record the bytes in locations 108–111. You can then POKE these bytes back in to reenable Ctrl-Break.

7. The statement PEEK (1137) AND 128

has the value 128 if the Ctrl-Break sequence has been used since

startup to terminate the execution of a program.

8. To disable the keyboard (PC and XT only), send

OUT 97, INP(97) OR 128

Note: Remember that when the keyboard is disabled, subse-

quent key strokes are ignored.

9. To reenable the keyboard (PC and XT only), send

OUT 97, INP(97) AND 127

To disable all keyboard interrupts.

OUT 33,13¢

Note: if keys are pressed after the interrupts are disabled, the scan codes of the first 20 keys will be held in a buffer located in the keyboard unit. These codes will be read after the interrupts are reenabled.

11. To reenable keyboard interrupts,

OUT 33.128

12. Each key has an identifying number called its scan code. The following program will usually obtain the scan code of a key. After typing RUN, you must press the Enter key quickly. Then press any key to obtain its scan code. (The program will not work on the PC AT or certain IBM PC—compatibles.)

10 OUT 33,130 20 WHILE INP(96)=0: WEND 30 PRINT INP(96) 40 OUT 33,128

13. For the PC AT only: when a key is held down for more

than  $V_2$  second (the default delay time), it repeats ten times per second (the default typernatic rate). To change the delay rate to d quarter-seconds (d=1,2,3, or 4) and the typernatic rate to approximately r repetitions per second (r between 2 and 30), you would enter the following:

OUT 96.243: OUT 96.n

where n = (d-1)*32 + CINT(11.5*LOG(29/r))

Conversely, the statement

OUT 96,243:OUT 96,n

with n = 0,1,...,127, specifies a delay rate of 1 + (n/32) quarterseconds and a typematic rate of

1/((8+(n MOD 8))*2°((n AND 24)/8)*.00417)

repetitions per second. The default state corresponds to n=44. 14. For the PC AT only. The three green lights that indicate Capal.cock, NumLock, and ScrollLock status can be turned on and off without altering any of the states. The statement

OUT 96,237: OUT 96,n

produces the following results:

n=7 all indicators on n=6 ScrollLock indicator off, others on

n=5 NumLock indicator off, others on n=4 CapsLock indicator on, others off

n=3 CapsLock indicator off, others on n=2 NumLock indicator on, others off

n=1 ScrollLock indicator on, others off n=0 all indicators off

B. Monitor Status

To check the type of display,

PEEK (1040) AND 48 = 0 no monitors

2. To select a display

Monochrome POKE 1040, PEEK (1040) OR 48

Graphics POKE 1040, (PEEK (1040) AND 207) OR 16

Note: The first POKE should be followed by SCREEN Ø: WIDTH 40: WIDTH 80:

LOCATE , , 1 , 12 , 13 and the second by

SCREEN 1,0,0,0: SCREEN 0: WIDTH 40:

Before switching monitor types, it is a good idea to record (in an array) the numbers that are contained in memory locations 1097 to 1126. These values can then be confidently restored after the return to the first display.

3. To check screen mode,

- PEEK (1097) = 0 text mode, WIDTH 40, color disabled
  - = 1 text mode, WIDTH 40, color enabled
    - = 2 text mode, WIDTH 80, color disabled = 3 text mode, WIDTH 80, color enabled
    - = 4 medium-res, graphics, color enabled
    - = 5 medium-res. graphics, color disabled
    - = 6 high-resolution graphics

= 7 monochrome display PEEK (1098) +256*PEEK (1099) gives the width in col-

Note: Color can be suppressed only on composite monitors. RGB monitors will display color even if you are in one of the color-disabled modes listed above.

4. Subscripts and superscripts can be displayed in the top half of the graphics screens. The following programs place the string BS as a subscript of the string AS. The value of R must be between 1 and 12, and the value of C can be at most one more than the width of the screen minus the sum of the lengths of the two strings. To display B\$ as a superscript of A\$, replace the R in line 40 by R-1.

28	SCREEN 1: CLS LOCATE R,C: PRINT	AS; 28	SCREEN 2: CLS LOCATE R.C. PRINT AS;	
30	POKE 1898,28	30	PORE 1898.48	
48	LOCATE 2°R: PRINT		LOCATE 2°R: PRINT B\$	
58	PORE 1898,48	50	POKE 1898,88	

The contents of the graphics screen are stored in a buffer beginning at offset

PEEK(1102)+256*PEEK(1103)

in a portion of memory that physically resides on a graphics board. The size of this buffer is given by

PEEK(1100)+256*PEEK(1101)

6. When using text mode with a graphics monitor, there are several memory pages at your disposal. The cursor locations for the various pages are given as follows: Let CR(n) and CC(n)be the Cursor Row and Cursor Column for page n. Then

PEEK(1105+2*n) has a value of CR(n)-1, and

PEEK(1104+2*n)

has a value of CC(n)-1. 7. The shape of the cursor can be set with a statement of the

LOCATE ...I.J

In this LOCATE statement

PEEK(1121) AND 31 has value 1, and

PEEK(1120) AND 31

has value J. If

PEEK(1121) AND 32

has a value of 32, then the cursor is not displayed.

8. To obtain the number of the visual page (that is, the page currently displayed), you simply

PERK (1122)

9. The adapter boards can be given instructions by OUTing to ports on a chip known as the CRT controller chip. To determine the number of the index register port for the adapter board currently in use.

PEEK(1123)+256*PEEK(1124)

The value will be 948 for the monochrome display board and 980 for the color/graphics adapter.

10. The following statements check the mode settings on the CRT mode register currently in use:

PEEK(1125) AND 1 has value I if in text mode,

width 80. PEEK(1125) AND 2 has value 2 if in graphics mode. PEEK(1125) AND 4 has value 4 if color is disabled

(for instance, if the statement SCREEN 1.1 has been executed).

has value 8 if video is enabled. PEEK(1125) AND 8 that is, not blanked. PEEK (1125) AND 16 has value 16 if in high-resolution

graphics mode. PEEK(1125) AND 32 has value 32 if blinking is enabled.

The value of PEEK (1125) will change after appropriate SCREEN or WIDTH statements are executed. It is not affected by OUT statements, however. It will not always reflect the true status of the monitor, therefore, unless it is updated after OUTs to port 984 or 952.

11. In the medium-resolution graphics mode, the background color and palette are selected by the statement COLOR b.p. The statement

PEEK(1126) AND 15

will have the value b, and

(PEEK(1126) AND 32)/32

will have the value p. In text mode, with a color monitor, the

value of PEEK (1126) MOD 16

will be the border color, and

PEEK(1126) AND 16

will be 16 if the current color was specified by a statement of the form COLOR f,b in which f is 0 through 15 and b>7.

The value of PEEK (1126) will change after appropriate SCREEN or COLOR statements are executed. However, it is not affected by OUT statements. Therefore, it will not always

#### PEEKS AND POKES

reflect the true status of the monitor unless it is updated after OUTs to port 985.

12. In graphics mode, the statement

PRINT CHR\$(n)

where n is a number from 128 to 254, causes the computer to display the character in an 8 by 8 rectangle of pixels. Each character is described by a sequence of eight bytes. The eight bytes describing CHR\$(128) are contained in the eight successive memory locations beginning with the location of offset

PEEK(124)+256*PEEK(125)

in segment

PERK(126)+256*PEEK(127)

The pattern for CHR\$(129) is contained in the next eight locations, and so on. To create a character set for ASCII values from 128 to 254:

Select the portion of memory to hold the bytes describing the characters.

 b. POKE the pattern for character 128 into the first eight memory locations, the pattern for character 129 into the next

 POKE the offset and segment of the first byte into locations 124 to 127.

 The video parameter table consists of 64 bytes beginning at the memory location of offset

PEEK(116)+256*PEEK(117)

eight locations, and so on.

in segment

PERK(118)+256*PEEK(119)

The first 16 bytes are numbers that are OUTed to registers on the color/graphics board when the 40 by 25 text mode is initialized. The next two 16-byte sequences are associated with the 80 by 25 text and graphics modes on the color/graphics adapter. The final sequence of 16 bytes is used to initialize the mono-

chrome display.

Note: You must be very careful when changing these bytes:
Certain values for the first 10 bytes in each sequence could
damage your monitor.

C Printe

1. The number of printer adapters installed is given by

(PEEK(1041)AND192)/64

To determine the first port associated with LPTn
 PEEK (1030+2*n) +256*PEEK (1031+2*n)

If this number is 0, then LPTn is not available.

To swap two printers, interchange their initial port numbers.

Denote the first port associated with LPTn by Pn. The value of P1 will be 956 if LPT1 is attached to the IBM monochrome display and parallel printer adapter.

3. The ASCI value of the last character sent to the printer by

LPRINT or PRINT# is

INP(Pn)

4. To determine printer status

LET X=INP(Pn+1)

X AND 128 has value 128 if the printer is busy or off

X AND 64 has value 0 if the printer has acknowledged that data has been sent and is

ready to receive more.

X AND 32 has value 32 if the printer is out of

X AND 16 has value 16 if the printer is on-line.

X AND 8 has value 0 if there is an I/O error.

To initialize the printer, send

OUT Pn+2,8: OUT Pn+2,12

 With PCs having 256K RAM motherboards, the parallel printer timeout values can be read and set. The timeout value for LPTn is approximately

1.6*PEEK(1143+n)

seconds. To set the timeout value for LPTn to S seconds,

POKE 1143+n, .64*S

D. Disk Drives

1. To determine the number of diskette drives, (PREK (1040) AND ) * (1+PREK (1040) 64)

2. In determining the status of a drive motor.

PEEK(1087) AND 128

has a value of 128 when a disk drive is being written to, and

PEEK(1087) AND 15

has a value of 0 when no drive motor is running. If drive L is running, then the value of

PEEK(1087) AND 2 (ASC("L")-65)

will be 1. Drive L here is A, B, C, or D, and the letter must be typed in uppercase. These values are not affected if an OUT was used to turn on the motor.

 To turn on drive L for n seconds, where n is at most 14, POKE 1688, 18, 2*n;

OUT 1010,2 (ASC("L")-61)+ASC("L")-53

Location 1088 holds the countdown, in clock ticks, until the diskette motor is shut off.

4. To turn off all drives, send

4. To turn ou all unives, se Our linin 12

5. To determine the diskette track that was last accessed, use

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#### PEEK(1093)

6. To determine which diskette head (0 or 1) was last accessed, use

#### PEEK(1094)

7. Similarly, to determine which diskette sector was last accessed

#### PEEK (1095)

Note: When single-sided diskettes are used, items 5, 6, and 7 above may specify the sector following the one most recently accessed.

- 8. The number of bytes per sector on a diskette is given by
- 128*2°PEEK(1Ø96)

  9. The diskette parameter table consists of 11 bytes. To ex-

(PEEK(D) AND 240)\8 is the time (in milliseconds)

plore this, LET D = PEEK(120)+256*PEEK(121)

#### Then, after executing

DDD CDC DDDT// CCC - CCC + DDDT// LCC

DEF SEG = PEEK(122)+256*PEEK(123)

you can derive the following table:

	required for the diskette drive to move from track to track.
(PEEK(D) AND 15)*32	is the head unload time (in
	milliseconds) after a read or write
	operation has occurred.
(PEEK(D+1) AND 240)\4	is the head load time (in
	milliseconds).
PEEK(D+1) AND 15	is the Direct Memory Access
	mode.
PEEK(D+2)	is the wait time until turning
	the motor off.
PEEK(D+3)	is the number of bytes per
	sector on the disk. A value of v
	specifies 128*2 v bytes per
	sector, for $v=0$ to 3.
PEEK(D+4)	is the number of sectors per
	track, usually 8 or 9.
PEEK(D+5)	is the gap length (in bytes)
	between sectors.
PEEK(D+6)	is the data length that you
	read out or write into a sector
	when the sector length is not
	specified.
PEEK(D+7)	is the gap length used when
T distribution 1.	formatting.
PEEK(D+8)	is the value the format
I BER (D.O)	operation uses to initialize
	diskette sectors, usually 256.
PEEK(D+9)	is the number of milliseconds
FEER(DT9)	allowed for the heads to stabilize

PEEK (D+16)

is the number of eighths of a second to allow for motor startup.

Caution: Changing the values of PEEK(D+3) and PEEK(D+4) can modify the way that diskettes are read and might require you to format your diskettes manually.

10. The number of hard disks on a PC-XT can be found with

#### PEEK(1141)

11. If a single diskette drive is used for both drives A: and B:, its current role is

CHR\$(65 + PEEK(1284))

#### E. RS-232 Interface

1. The number of RS-232 cards attached can be found with

#### (PEEK(1041) AND 14)/2

 To determine the first of the seven ports associated with COMn.

If this number is 0, then COMn is not available. To swap two RS-232 interfaces, interchange their initial port numbers. Denote the initial port associated with COMn by Pn. Normally, the value of Pl is 1016 and the value of P2 is 760.

#### 3. Interrupt enabling:

- OUT Pn+1,1 enables an interrupt when a character has
- been received.

  OUT Pn+1,2 enables an interrupt when a character has
- been transmitted.

  OUT Pn+1,4 enables an interrupt when an error has
  - occurred.

    OUT Pn+1,8 enables an interrupt when the modem status has changed.

To enable several of the above interrupts at the same time, OUT the sum of the associated numbers to port Pn+1.

the sum of the associated numbers to port Pn+1.
 To identify interrupts, use the port number determined above (Pn) and

#### LET X = INP(Pn+2)

X AND 1 has a value of 1 as long as no interrupts have been issued because of communications port activity. Similarly, X AND 6 is used to identify the highest priority interrupt pending, as indicated in the table "Interrupt Control Functions" in the IBM Technical Reference manual.

- IBM Technical Reference manual.

  5. To establish the number of data bits (d), the number of stop bits(s), and the parity (p=0) for no parity, p=1 for odd pari-
- ty, p=3 for even parity), send

  OUT Pn+3, d-5 + 4*(s-1) + 8*p

  6. To establish the band rate
  - H=INP(Pn+3):OUT Pn+3,H OR 128:



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OUT Pn DL:OUT Pn+1 DH:OUT Pn+3 H

Use the values DL=128 and DH=1 for 300 baud, and DL=96 and DH=0 for baud rate 1200. Otherwise, DL=d MOD 256 and DH=d256, where d is the divisor number given by the IBM Technical Reference manual in the table "Baud Rate at 1.843 MHz".

7. To produce a break signal,

X=INP(Pn+3):OUT Pn+3,X OR 64:PLAY "MF": SOUND 32767 6: SOUND 32767.1: OUT Pn+3 X

The PLAY and SOUND statements produce a delay of 1/3 second.

8. To control the modern, use

OUT Pn+4,1 to assert that the data terminal is ready (DTR).

OUT Pn+4,2 to raise a request to send (RTS). OUT Pn+4,16 to perform loopback testing.

To accomplish several of the above tasks simultaneously, OUT the sum of the associated numbers to port Pn+4.

9. To determine the status of data transfer, begin with

LET X = INP(Pn+5)

#### Now

X AND 64 has a value of 64 if the transmitter shift

register is idle.

X AND 32 is 32 if the transmitter holding register is

ready to accept a character for transmission.

X AND 16 has the value 16 if the received data input is held in the spacing state too long (that is, if a

break was received).

X AND 8 has the value 8 if the received character did not have a valid stop bit; that is, if a framing error occurred.

X AND 4 has the value 4 if the received character does not have the correct parity.

X AND 2 is 2 if the received data destroyed the previous character (an overrun error). X AND 1 has value 1 if a character is ready to be

read from the receiver buffer register.

10. INP(Pn) will read the ASCII value of a character from the serial port, provided

(INP(Pn+5) AND 1) = 1

 You can use OUT Pn,m to write the character with AS-CII value m to the serial port, provided that

(INP(Pn+5) AND 32) = 32

To determine the status of the modern, use
 X = INP(Pn+6)

_

X AND 128 has the value 128 if a Carrier signal has

been detected

X AND 64 is 64 if the modern is ringing.

X AND 32 has a value of 32 if the modern has asserted Data Set Ready.

X AND 16 is 16 if the modern has asserted Clear to Send.

X AND 8 is 8 if the Carrier Detect has changed state.

X AND 4 has the value 4 if the Ring Indicator input has changed from On to Off.

X AND 2 is 2 if the Data Set Ready input has changed state since the last time it was read.

X AND 1 has a value of 1 if the Clear to Send input has changed state since it was last read.

#### F. Speaker

The timer chip determines the frequency of the sound produced by the speaker. To prepare to send a value to the timer chip, send

OUT 67 182

2. The human ear can perceive sounds varying in frequency from about 20 to  $20,000\,\mathrm{Hz}$ . To set the timer chip to produce a frequency of  $F\,\mathrm{Hz}$ ,

A=INT(1193182/F): H=INT(A/256): L=A-H*256: OUT 66,L: OUT 66,H

3. To turn the speaker on, use

OUT 97, INP(97) OR 3

4. Conversely, to turn the speaker off

OUT 97, INP(97) AND 252

G. Cassette Port Control

 To turn the cassette motor on,

OUT 97, INP(97) AND 247

2. To turn the cassette motor off.

OUT 97, INP(97) OR 8

Even if a cassette player is not attached, toggling the cassette motor produces a clicking sound. Repeated togglings can produce interesting sound effects, but since the relay involved is not designed as a musical instrument, excessive use may cause its failure.

#### H. Miscellaneous

1. The number of game adapters attached is shown with

(PEEK(1041) AND 16)/16

2. To find the size of RAM in kilobytes, use

PEEK(1043) + 256*PEEK(1044)

The internal clock ticks 18.20648 times per second. The number of ticks that have occurred since midnight is given by

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#### PEEK(1132)+256*PEEK(1133)+65536*PEEK(1134)

This value increases until it reaches 1,533,039 (an instant before midnight), and at midnight it is reset to 0. The value of PEEK(1136) is increased by 1 as a result of the reset. Executing either TIMES or DATES changes the value of PEEK(1136) back to 0.

To determine the date N days from now, execute

FOR I=1 TO N: POKE 1136.1: AS=DATES: NEXT I: PRINT DATES.

With versions of DOS prior to 3.0, when N is less than 256, the entire FOR... NEXT loop can be replaced by POKE 1136, N. 4. Memory locations 1264 to 1279 are not used by either

DOS or BASIC. Data can be passed from one program to another by POKEing it into these locations and PEEKing it later. 5. To exit BASIC and complicate reinvoking it, you can

POKE 1295,2: SYSTEM

Note: Memory location 1295 is set to 2 when the BASIC command SHELL is executed.

6. The segment number of BASIC's data segment may be found with

PEEK (1296) +256*PEEK (1297)

7. To disable the nth interrupt.

POKE n*4,83:POKE n*4+1,255: POKE n*4+2, Ø: POKE n*4+3,24Ø

Prior to executing these statements, use PEEK to record the contents of the four memory locations. To reenable the interrupt, use POKE to restore these locations to their original state.

Editor's note: The concluding part of Prof. Schneider's article will appear in the next issue of PC Magazine. It will allow you to explore other parts of the PC's memory, including the BASIC data and storage areas, the memory areas for the monochrome and color (text and graphics) monitors, and ROM. Also included are three additional demonstration programs that provide a quick overview of the facilities surveyed.

David 1. Schneider is an associate professor of mathematics at the University of Maryland and is the author of Handbook of BASIC for the IBM PC: Revised and Expanded, published by Brady Computer Books, Simon and Schuster, 1230 Avenue of the Americas New York NY 10020 (800) 624-0023

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# Of Fox & Geller Enhancements For dBASE III

Fox & Geller, longtime makers of dBASE II enhancement utilities, has come up with a mixed bag of upgraded and

new products for making dBASE III easier to use.

ox & Geller was one of the first companies to anticipate dBASE It's gigantic success—it cashed in on that success by designing products to add functionality to dBASE It white making it less onerous to use. These programs, which were originally written under CP/M, as was dBASE II, were later ported over to DOS and the IBM PC.

Fox & Geller has upgraded some of its older programs and released some new ones, QUICKCODE, QUICKREPORT, QUICKINDEX, dGRAPH, and dUTIL, to

work with dBASE III

QUICKCODE is a program generator that creates a complex suite of dBASE III command programs and other files based on a screen design that you enter. It is the most complicated and sophisticated of the Fox & Geller offerings, yet it is aimed at least partially at users without advanced programming skills.

QUICKREPORT is a system for designing and executing printed report forms using dBASE III data files. It is one of the newer Fox & Geller programs, and that fact shows in the elegance of its conception and implementation. The interface used in QUICKREPORT is derived from Astron-Tate's Framework, but it displays some oriental thinking as well.

QUICKINDEX is a simple utility that is probably the dark-horse winner in the Fox & Geller stable. It does only one thing—it indexes dBASE III files quickly—but it does that so well that it has gained a permanent place on my dBASE III disks (and the dBASE disks of my clients).

dGRAPH is a presentation graphics program designed to produce the standard bar, pie, line, and other charts often used in business. It does not have to be used with dBASE III, since it accepts direct entry of data from the keyboard, but its main claim to fame is a special interface that allows direct accepts to dRASE III files.

The final package, dUTIL, is a collection of debugging tools and utilities intended mainly for the less-than-expert dBASE programmer.

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#### OUICKCODE

OUICKCODE was the program that launched Fox & Geller in the personal computer software market. Although the company has ostensibly undated this program generator for dBASE III, it's hard to tell at first glance. The code it generates has a definite dBASE II "style," with such giveaway clues as REPLACE commands and senurolous RELEASE commands for variables at the conclusion of a program module. I couldn't find any indication that it has incorporated dBASE III style or commands, other than any necessary changes to accommo-

date syntax differences. One significant change is copy protection. The newest dBASE III version of the program employs the same copy protection scheme as dBASE III and Framework but allows you to make two copies from the distribution disk instead of the one copy allowed by Ashton-Tate. Earlier Fox & Geller programs are not copy protected

Designing forms to input to the OUICKCODE code generation facilities is fast and painless, OUICKCODE can use text files (with the extension .TXT) as input in addition to screens you draw within the program itself. You can put text anywhere on the screen; you indicate data fields by preceding the name of the field with a semicolon. The program uses the dollar sign (\$) as a suffix designating the money data type, a symbol sure to confuse BASIC programmers but certainly evoca-

tive and appropriate. QUICKCODE includes flexible and clever methods to set the length of a data field. The default is the number of spaces remaining on the screen line, which is almost always too long. This value can be overridden manually, or you can use a

greater-than symbol (>) to mark the end of a field. Up to 128 fields can appear on a single screen, to a 4,000-character maximum per record. The program makes no provisions for niceties like capitalizing entrics.

QUICKCODE can produce screens and

QUICKCODE OUICKREPORT OUICKINDEX KGRAPH

AUTH Fox & Geller 604 Market St

Elmwood Park, NJ 07407 (201) 794-8883 List Prices: QUICKCODE, \$295; QUICKREPORT, \$177: QUICKINDEX. \$99:

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#### dBASE III ENHANCEMENTS

reports up to 132 columns wide; it has toggling features to let you move easily over these wide screens or reports even on a normal 80-column display. A grid can be created on the input screen as a positioning aid. An "autopilot" feature limits screens to 20 lines, sets margins, and specifies which types of program modules will be generated. You can create up to 16 files from the one screen layout.

You specify how each field should behave by responding to prompts in the field mode. Your choices of field type-character, telephone, date, social security number, integer, numeric, money, or logical field-include several more than dBASE III itself offers. Field order determines the order of records in the file. You can specify a default value for any field, which will appear as the suggested entry value. OUICKCODE offers three types of data validation: A "range checking" system uses minimum and maximum values that you provide and responds to entries outside this range by displaying a short error message. A "list checking" method validates entered data against a short list that you provide. "Index checking" compares the entered value against the entries in an external data file.

A specialized subsystem called QUICKMENU creates menus that can even be used with programs written outside of OUICKCODE. OUICKMENU is flexible and easy to use and creates workable code that you can readily clean further. The only drawback is that menu choices are made with a long series of IF-ELSE-ENDIF statements rather than the cleaner CASE structure.

OUICKCODE's documentation is divided into two main sections, one a typeset tutorial, the other a reference section produced with a daisy wheel printer. The latter is, strangely enough, easier to read. A decent index and table of contents are included, as is a tacky-looking folded reference card. The card includes a chart of the graphics characters assigned to the keys in graphics mode and a list of the oddball control codes used at the same stage of the

Its complete suite of performance demonstration programs also lets you practice generating code with QUICKCODE. The generated programs form a personneltracking database system. The demos include only the basic screen files; OUICK-CODE itself generates all the executable dBASE III files-49 files in all. The code creation process is very fast; It took only a couple of minutes to generate all these

The generated program includes a reasonably good, although not flawless, system that searches the databases for specific records that match a criterion entered by the operator. One problem with this and other OUICKCODE programs is that a search will always stop at the last record in a data file, even if it doesn't match a search criterion. Perhaps worse, you have no automatic way to build a search criterion. The relevant field names are not shown anywhere, and the QUICKCODE manual blithely suggests that you "consult your dBASE manual" to learn how to use the relational operators necessary to construct a criterion.

The OUICKCODE-generated demo program prints the worst-looking mailing labels I've ever seen. It doesn't use the dBASE TRIM function, so the information on each line is widely spread out.

The QUICKCODE demo program that produces reports requires that the operator know the name assigned to the stored reports. Once again, this is poor program design; the program should display a list of stored report formats.

On one level, the sample program suite is an impressive demonstration of what QUICKCODE can do. A large amount of functional code is produced in a small amount of time. On the other hand, many users would find many aspects of the code produced unacceptable in real-world business software.

With many code generators, the time it takes to clean up and enhance the generated code is greater than the time you save with the automatic process. Particularly for dBASE beginners, QUICKCODE is a partial exception to that rule.

#### OUICKREPORT

OUICKREPORT is a fairly recent Fox & Geller entry, and the company's experience shows in the program's design. Perhaps the most impressive aspect of the program is its absolutely lovely user interface. The IBM PC has no "standard" interface

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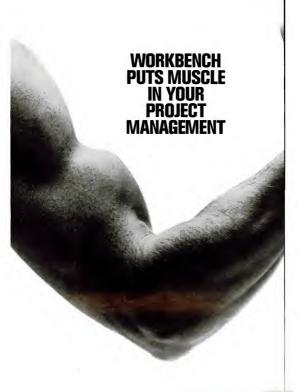
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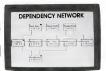
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as does, for example, the Apple Macintosh. If one were to be imposed. I'd cast my vote for OUICKREPORT's. The QUICKREPORT screen contains

ous program functions. Three of the windows are small. They consist of a message area at the bottom of the screen, a list window where available file and field names four "windows" in which it presents variappear, and an information line used for

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status data and other processing. The main screen area serves two pur-

poses. In its menu mode, it displays a series of pull-down menus very similar to those in Framework. The menus are fast and convenient, although they would be even better with a mouse option. In an alternate "blackboard" mode, this same

area is where the actual report is drawn. The blackboard is divided into several areas (bracket-type lines on the left edge of the screen indicate the amount of space occupied by each): The report header contains anything you want to print on the page before the start of the report proper, such as a memo. The page header contains the text that will appear at the top of every page. Database fields or computed fields can go in this area. The report body area contains the actual report. The page footer holds a footer that will appear on each report page. Finally, the report footer area contains anything you want to print at the end of the report proper, such as report totals or a summary.

You can enter text in any of these areas and format through the print menu, which assigns special printing characteristics to text or to report fields, and the edit menu, which lets you center lines, set the number of columns for tabs, and adjust the amount to scroll vertically and horizontally during the definition process.

Individual fields can be formatted in a number of interesting ways. For instance, you can suppress repeated fields; right, left, or center justify a field; specify decimal places; choose among seven different date formats; add commas to large numbers; and fill a field with a specified character, as for checks.

A convenient and well-thought-out selection system makes selecting the data files and the fields within a file for a report very easy. Your choices appear in a window, and you simply move the cursor to the desired item and press Return to make a choice. Three "system" variables are also available: the date and time and the current page number as a report is printed.

You can control or modify output in several ways. The layout menu allows you to change too, bottom, left, and right margins, page size, and printer width, add a single-sheet pause, and determine other design elements. The reports can be sent to

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Once you've designed the report, you can specify an extraction criterion for records; the program will examine each record to determine whether it fits. You use the standard relational operators, logical

operators like AND, OR, and NOT, and several standard dBASE III functions to formulate simple or complex selection definitions. QUICKREPORT can build an extraction criterion into the permanent definition of a report or, alternatively, you can specify an ad hoc extraction definition when you run a report.

QÜICKREPORT can extract data from allows up to five linked files, you can include data from up to six files in a given report. You must use dBASE (or Fox & Geller's new QUICKINDEX utility, discussed below) to create the necessary NDX files on the key field.

Subsidiary files are linked to the master file via the control menu. A well-conceived system handles missing records in a secondary file: When QUICKREPORT finds an empty record, you can have it print a space, skip the master file record, or exit to the OUICKREPORT menu system, aborting the printout. Another clever feature is the procedure to read duplicate matching records in the link file. OUICK-REPORT keeps reading the secondary file until it finds no more matches-a form of transaction processing that can be quite powerful in certain classes of reports. QUICKREPORT can also chain duplicate link files, so you can define rather complex

relational structures.

QUICKREPORT: documentation now matches the standard lifeM size, three-ing bisder, a mach more convenient form tight of the properties of the properties of the properties of reduced photocopies of the larger pages. It's not badly produced, but the characters are small and rather light. The manual is well written, with an extended unevil accion that does a good job of sourcying the program is features. All contained in the properties of

The sample reports on the disk and in the manual are quite unattractive, which is unusual considering how elegant and even beautiful the screen interface is.

mention.

QUICKREPORT generates reports very quickly and smoothly. I'm not sure, however, who it is really for. While it certainly is easier to create a report with OUICKREPORT than by programming in

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#### **dBASE III ENHANCEMENTS**

dBASE, there really isn't anything all that spectacular about the reports. And since it's a standalone program that produces renorts from dBASE files rather than generate command files to drive dBASE III to produce the reports itself, you can't fiddle with the format by manipulating the code.

#### QUICKINDEX

OUICKINDEX does just what its name implies: It quickly indexes dBASE III files. It can be run from within dBASE III if your computer has enough memory (the dBASE III RUN command requires more than the minimum 256K bytes in which dBASE III itself will run), or directly from DOS. Its command syntax is simple: You merely supply the name of the database file, the field or expression on which to index, and the name to assign to the resulting index file. QUICKINDEX does the rest.

Fox & Geller claims that OUICKIN-DEX is "more than ten times faster than dRASE "On the tests I ran to prove or disprove this assertion, QUICKINDEX was consistently six to eight times faster than dBASE III's internal INDEX command. In any case, QUICKINDEX is fast! It's fun to watch the "odometers" QUICKINDEX uses to show how many records are in the data file, the number sorted (in increments of ten), and the percentage this number represents of the total.

On small and medium-size files, running OUICKINDEX from within dBASE III doesn't exact any significant time penalty, although you might pay a minor price on much larger files.

The index files created by OUICKIN-DEX work perfectly with database files. It takes the same amount of time to completely list the database whether you generate the index files with OUICKINDEX or dBASE III. But the "sorted" order that results from OUICKINDEX indexes is not precisely the same as the order generated by dBASE III-in fact, the QUICKINDEX indexes are more logical and consistent.

The OUICKINDEX creates the same size index files whether you run the program from DOS or dBASE III, but they are not exactly the same size as the index files dBASE itself creates. Some of the OUICK-INDEX index files are slightly larger, some slightly smaller. Examining the index files with a debugger. I found extrane-

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ous garbage in some dBASE III index files that did not appear in the QUICKINDEX files I created.

Fox & Geller's three-page 'manual' doesn't need to be any longer—what is there to say about something that works so well and is so simple to use? QUICKIN-DEX delivers on its manufacturer's claims, and its very reasonable price makes it a bargain for users with heavy-weight indexing tasks.

#### dGRAPH

Fox & Geller positions dGRAPH as a "graphical query system" or "graphical reporting system" for "dBASE III files; system" for dBASE III files; Fox & Geller could have included handling of dBASE III files as well (some people may not want to convert all their II files to III) but chose not to.

dGRAPH operations use menus and fill-in-the-blanks forms. You don't have to memorize complicated commands, although some of the options are not terribly obvious. Some dGRAPH options can be chosen directly from the DOS command line, bypassing the menu system.

The main menu specifies the different

types of filenames dGRAPH works with (there are so many that keeping track of them all is potentially confusing to a beginner), and it includes options that let you adjust various settings, retrieve definitions of pictures or multiple charts, enter data, and perform other functions. Entering and editing data from the key-

board is a line-oriented process that seems quite clumsy in these days of full-screen editors. You must choose between integers and fractional numbers, also a primitive requirement. The entire data entry process feels like a throwback to earlier, much less desirable methods.

Once you have entered or recalled data, you can produce bar, stacked bar, line, pie, and 'pichar' charts. A piebar chart is rather interesting: It uses wide, segmented bars that not only show scale, but percentage, the way a circular pie chart does. This can be an effective way to convey certain kinds of relationships.

A long list of options controls the way in which a chart is drawn. You set each option either on or off. The most significant is "autograph," which determines scaling and sets shading or line patterns to default values. Unfortunately, this autograph option sets the minimum value on the y axis to the lowest data value, not to zero. To ob-

y, you must disable autograph and manually set the shading and other scaling.

tion sets the minimum value on the y axis to the lowest data value, not to zero. To obtain the more common zero minimum for



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#### dBASE III ENHANCEMENTS

lent-visual and straightforward. Similarly, shading can be changed easily, although only five kinds of shading (including blank and solid fill) are available for a bar chart, and only four kinds of lines and four kinds of points available for line charts. Pie and piebar charts are much more flexible with 12 shading options available

Chart titles can be changed easily, but you have no flexibility on positioning titles (or anything else, for that matter). dGRAPH has only one unattractive font. But you can print any text file under the graph-a very nice touch for detailed notations. Some other interesting options include "zoom," to zoom in on a portion of a line or bar graph, "average," to put an average line on a bar or line chart, and "accumulate," to chart the sum of a data series. You can create multiple charts from previously computed charts and combine three charts if they are all black and white, but you can display or plot only two color charts on a page

Installing dGRAPH is easy. A straightforward menu program allows you to specify the type of screen adapter/display you'll be using-monochrome (with which you get no on-screen display or preview of graphics) or a color adapter driving either a monochrome or color monitor. The selection of supported plotters is very limited: If you have a Hewlett-Packard 7470 or 7475, you're OK; otherwise, no plots. The list of supported printers is

somewhat more extensive. dGRAPH output to my HP 7475 plotter was acceptable. It was difficult to find the correct hardware settings for the plotter, but I finally located them in the dGRAPH specifications section of the documentation. The detailed instructions for activating the plotter were hidden in the section on defining charts. dGRAPH plots at only 1200 baud, but this limitation doesn't seem to slow down the actual plotting all that much. The plotted charts are just as dull as the screen plots, but unlike with some other programs, at least there's a close correspondence! Another weakness is that dGRAPH includes no provision for pen changing. Six colors is the limit on an HP 7475, and only two colors can be plotted on a 7470. The graphs dGRAPH produces are not

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#### dBASE III ENHANCEMENTS

particularly attractive. The lack of varied type fonts and other niceties lends a rather primitive cast to the charts. The layout of the various chart elements is dull and uninteresting. Screen drawing is rather slow, even on the AT.

even die APIA highly touted direct dBASE. Will interface is more ways a disappointment. The dBASE interface shows the fields in a DBF file (only 32 fields at a time, an obvious throwback to the dBASE. Will interface of his number of fields). Rolf fers five ways to accumulate data: average sum, court, and percentage of court or sum. dRAPIP can court text fields, but obviously most of these functions are designed for numeric fields. The manual attentions are designed for numeric fields. The manual activation of the designed for numeric fields. The manual activation of the designed for numeric fields. The manual activation of the designed for numeric fields. The manual activation of the designed for numeric fields. The manual activation of the designed for numeric fields. The manual activation of the designed for numeric fields. The manual activation of the designed for numeric fields. The manual activation of the designed field field field fields and the designed field fi

murky here. The program has a mechanism to specify exclusion criteria that determine if a given record will be charted or not; excluded records can be displayed in an "exclusion report." The idea is to extract chart data from a dBASE III file, possibly with various mathematical manipulations along the way, rather than to enter dBASE and write out the exact desired data. This idea is reasonable-the data remains intact as an entity and no special files need be created. However, a dBASE III power user (the presumed target for a product like dGRAPH) may well prefer the flexibility of dBASE commands, especially when any of the wonderful graphics programs available for the PC can then be used. Even the dGRAPH manual suggests using dBASE

itself for "complex" relationships. dGRAPH's graphs are not impressive compared with those of competitive products, although several interesting ideas are scattered through the system. Other products can produce far more creative graphics and can import data from a wide range of sources, such as DIF and SYLK files. The dBASE interface that is the cornerstone of dGRAPH is quite flexible but hard to comprehend, at least initially. The documentation is reasonably well written but is repetitive and not totally informative in several respects. These shortcomings, in which dGRAPH reveals its heritage as an older product, put it at a disadvantage as it

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#### dBASE III ENHANCEMENTS

attempts to compete against powerful, young competition.

dUTIL

Fox & Geller positions dUTIL as "the dBASE programmer's utility," claiming it can provide "faster running time, less programming, and easier debugging/ maintenance " These are all laudable objectives, but how well does dUTIL actually deliver? All of dUTIL's options are controlled

from one nicely laid out master menu screen, which is divided into functional segments. The top section contains the names of the files dUTIL uses or creates: KEYWORDS is an ASCII text file with an alphabetical list of the language significant to dBASE III. This list is used in dUTIL's automatic capitalization process. UNIT-LIST points to an optional text file you can create, which would contain a list of files to process; this file can be used to restrict dUTIL's action from its normal default operation to specified files. TREE refers to a file the program creates that stores an indented listing of program module use: this file is very useful in following the program flow through a complex dBASE application suite. The BATCH file is used to store instructions dUTIL creates to either display or print a group of files.

The next two screen areas control default and internal settings. You can adjust the number of spaces between tab settings for automatic indenting of the listings, and you can adjust depth level. dUTIL can handle up to nine depth levels, and most users will always want the maximum depth.

The fourth screen segment controls the various options and toggles that determine how dUTIL functions. These toggles handle everything from reading program files into a program to controlling insertion of page breaks when files are printed. You can retain your preferred settings in a configuration file that you can call directly from DOS, so you need enter a complex series of commands only once. The manual indicates that statements can't be more than 100 characters long, a limit that could present a major handicap if you tend to create complex statements.

When I tested dUTIL with a dBASE III program suite, problems surfaced immediately. dUTIL doesn't recognize dBASE III's SET PROCEDURE TO system. When if ther concurres a DO statement referring to a program segment stored in a PROC file. drift. attempts to locate a freestanding DO file of the same name and then abouts when it can't be found. You could work around this problem by dividing the segments of a PROC file between the standard or a PROC file between the st

dUTL did not remove comments correctly, even though the program was set to do so. It converted each comment into an instant error. The program also mishandled TEXT-ENDTEXT blocks, destroying formatting within them by removing grupty spacing lines and left-justifying everything, a procedure that rendered many of my menus unusable. dUTL also re-

moved any blank lines inserted for clarity anywhere in the source code.

dUTIL doesn't handle single or double quotation marks in a comment following statements like ENDIF, ENDDO, or the like. Instead, the program believes in puting comments after such statements and ula catually attempt to do so itself if the original programmer hasn't alteady put a comment there. If, however, the programmer's comment the surface of the programmer's comment to anything like. "User comment to a programmer's comment to anything like "User or "attempt to the programmer's comment to anything like "User or "attempt lissue the 'unmanched quote" error. More importantly, dUTIL will issue the 'unmanched quote "error. More importantly, dUTIL will issue the 'unmanched quote "error. More importantly, dUTIL will issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil issue the 'unmanched quote "error. More importantly, dutil error. All the error important in the 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'unit and 'un

legal DELIMITED WITH! statement.

dUTIL can assist in the location of certain types of logic errors, primarily those
involving misnesting of logical constructs
or missing symbols. No such errors appeared in my existing program, but dUTIL.
worked correctivy on a few test programs I

wrote with deliberate errors. My test suite consisted of 21 programs totaling 107,136 bytes (including comment headers and some embedded comments in the code it-self). dUTIL combined these separate files into one 226-570-byte monster file, taking

a 1/2 hour to do so on an AT.

The huge growth in file size is due to several factors. Perhaps the most significant is the repeated insertion of the same small blocks of code over and over again. All the extra indentation aUTIL inserts is done with spaces rather than tab characters. Comments were not removed, and the program inserted still more comments and its incorrect error messages.

dUTIL's chintzy original 8½ by 11 manual has been upgraded to an IBM-style folder that conforms with the rest of the line. As far as contents go, the manual is distinctly ambivalent about the benefits of combining a group of small files into one

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#### dBASE III ENHANCEMENTS

big file. Fox & Geller generally claims faster execution for a big file (through fewer disk accesses) but leaves itself an out by saying that you "must realize that large programs sometimes run slower than erous of smaller urperams."

It can take a lot of time and work to get a complex suite of programs to run through dUTIL. There is no question, however, that dBASE III can use debugging tools and utilities, and dUTIL has some nice features. It may be especially useful for less-than-expert programmers—those who

The more recent Fox & Geller efforts show tremendous growth. QUICKREPORT is elegant in many respects and QUICKINDEX is a truly fantastic indispensable

little program.

have not been already trained to indent correctly and use capitalization in an intelligent manner—and some of its tools are helpful to any programmer. But the current release of dUTIL is buggy and not fully acclimated to the dBASE III environment.

#### ummar

Fox & Geller's software has camed a good reputation over the years, and thousands of dBASE users have found the products useful. Nonetheless, the carrier products have a roughness that becomes increasingly less acceptable as microcomputer software becomes more sophisticaled. The conversion of some of the products to the dBASE III environment has not been completely successful.

The more recent Fox & Geller efforts show tremendous growth. QUICKRE-PORT is elegant in many respects and QUICKINDEX is a truly fantastic and indispensable little program. But software companies can go back and correct their earlier mistakes, and Fox & Geller should do so for its programs.

Glenn A. Hart is a contributing editor of PC Magazinc.

### **Technical Bulletin**

No. 2 in a series.

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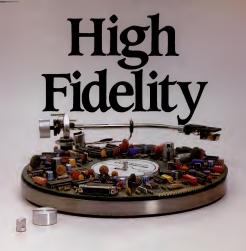
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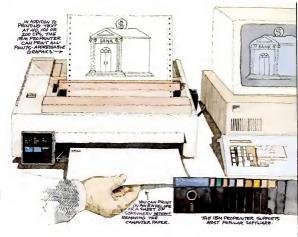
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Also called citation managers, literature-retrieval systems, and bibliography generators, bibliographic file managers can create, search, sort, and print out literature references in a variety of formats. They are useful in organizing collections of any kind of published material, including brochures, legal documents, corporate reports, and training manuals, as well as the academic books and journal articles for which they were originally developed.

INMAGIC, FINDER, and Notebook, three bibliographic file managers, have four basic functions common to the genre: They accept files either downloaded from on-line databases or created with a word processor, they permit the entry of individual records, they search data files created by either entry method, and they produce a printout for presentation or a text file for further modification with a word processor. To use any one of these three bibliographic file managers in conjunction with any information gained in searching online databases, you will need a computer equipped with a modem, a communications package, and a word processor that accepts ASCII files and has a macro-driven search-and-replace feature.

We loaded each program into a separate infectory on the hard disk of an IBM PC-XT and ran a standard set of exercises on each one. First, a sample of 20 references was typed into each program to test the speed of entry and celting ease. Then, we conducted a search on the ABI/NFO/RM. 200 counds. We then loaded these records into data files under each program. In our tests, we used three words to the conduction of the conduc

To compare search capabilities, we designed three searches to run on our 200record files. We searched a term that would produce many hits, one that produced no hits, and one complex phrase to test for nesting, phrase searching, Boolean capabilities, and truncation.

Finally, we challenged the formatting powers of each package by producing a publication-quality bibliography.

Search times on the data files were substantially reduced if the data files were transferred to disk using the DOS BACK. UP command and then returned to the hard disk using RESTORE. This was probably because of a rationalization of the disk's file allocation table that reduced external fragmentation and, consequently, seek time. In all cases, we used the shorter search times for the final results.

#### INMAGIC

INMAGIC, originally developed on a PDP-11/03 in FORTRAN 77, retains the flavor of its minicomputer origins. Those origins do mean the package has some powerful search-and-retrieve and index-

design features. Yet those same minicomputer origins have saddled the program with a prehistoric procedure for the manual entry and modification of records.

Five major modules, called environments, make up INMAGIC: define, maintain, select, sort, and audit. With the exception of select (the search-and-retrieve module), which is command-driven, all the modules feature menus or prompt queries.

The INMAGIC documentation is, unfortunately, a generic product used with both minicomputer and microcomputer versions of the program. You must be thoroughly familiar with the operations of DOS to use the documentation effectively. However, this failing is somewhat alleviated by an exemplary self-guided installation procedure.

In designing an INMAGIC database, you are confronted with a multitude of potions for structuring your data and indexes, you are confronted with a multitude of potions for structuring your data and indexes, making this program a questionable choice for the novice. However, the program's complexity translates into great power. Two particularly useful features are subtletds, which help you deal with such probtems as multiple sudhers and the ability to data files. The latter function could prove especially useful in a network where several people share a hard disk.

For searching, INMAGIC had no equal among the programs we reviewed. The command search language takes time to learn but permits great flexibility in structuring a search. INMAGIC supports the three Boolean operators AND, OR, and NOT; truncation of search terms; nesting; and the listing of index contents. You can

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save your search results during a session for use at a later time, and you can refine search results progressively. You can limit searches to a given range of values in a specified field, for example, to retrieve all pertinent records that fall within a certain range of dates. You can even apply Boolean operators to field names and labels.

The package is as fast as it is flexible, so long as you search indexed fields. A search of the terms "broadcasting" and "industry" located 187 matches in the indexed key-word field in 5 seconds. The same search in the title and unindexed abstract fields took 4 minutes and 53 seconds.

INMAGIC's highly indexed structure does exact a price in storage space. The overhead on the sample database was 61 percent. The amount of overhead depends heavily on your indexing choices, but with large databases, according to a representa-

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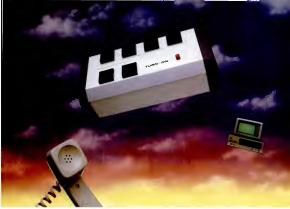


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tive of the company, a ratio of 3.5:1 between database files and source files is not unusual.

The report generator supports a wide variety of formst. You can select options for each field, specifying, for example, a text string to be printed before or after a field. The weakness of the report generator is its inability to perform an IF ...THEN test and choose a format based on the outcome. For instance, INMAGIC could not distinguish between citations for books and iournal articles.

Now for the bad news: the dinosaurlike manual-entry module. For local (as opposed to batch) entry of records, INMA-GIC supports only a crude, line-oriented editor without wordwrap capabilities, giving you all the disadvantages of a typewriter carriage return without the warning bell.

er carriage return without the warming of the Editing records is even worse. Although a new field or subfield can be inserted, text cannot be inserted into a field that already exists. Field substitutions are wholesale—the entire field must be retyped to effect a change. For these reasons, most users will wish to use a capable word processor to create files of records for additions to database.

The batch importation of the 200 ABI/INFORM citations went smoothly and required about I hour, including index generation, but not including alteration of

the source file by the word processor. Image lie no, plans an upgrade that will include an improved editor, support for arithmetic operations on numeric data, field-level security provisions, and a more flexible report generator. Despite the primtive editing and the weaknesses in report capabilities, INMAGIC's search-and-ertrieve functions provide a powerful tool for the management of large databases that must be searched rapidly.

#### FINDER

FINDER, appropriately for the most expensive program in this review, overwhelms you with options. The first decision you must make is how much of the system to buy. The FINDER package consists of three separately purchased modules. FINDER: the Retrieval System supports database design and individual record input, Finderlink permits batch import of records; and Search Companion

improves report generation. Within each package, possibilities abound; for example, Finderlink is the only package we reviewed that handles untagged, unstructured records. But important limitations mar this pobly conceived effort

Database design in FINDER: the Renieval System is a menu-driven process. You specify the name, length, sereen location, and type of indexing for each field. You can also select data-range checks on field contents. Once you enter the design menu, however, it is difficult to page backward through screens to make changes or even to exit the menu to begin again.

Although database design is otherwise flexible, only 256 characters are permitted within a field, and records are limited to one screen in length. This is insufficient for most bibliographic records from com-

mercial databases. Finder/ink is used to import records. You choose either the structured data editor for records separated by special character strings or defined by manhes of datafort finding the structured of the string of the structured of the structured records. The text editor is a unique, but cumbersome, featured as constructured records. The text editor is a unique, but cumbersome, featured as constructed is displayed, you position the cursor and strike function keys to insert field lags. In effect, the set editor gives you user-defined keybourd macros, the fields, and gives you a method of quickly fields, and gives you a method of quickly

deleting tags when you make a mistake. Once all your records are tagged, loading them into Finderfish is a matter of pressing one function key. Both the muual and screen messages warn conscientionally that loading and index creation can require several houses (and are perhaps best done overnight). This warning is well-take en, our 200-record file download from the BRS-Saunders Colleague database took 6 hours to process, with almost constant

hard disk activity.
For searching the database, you return to FINDER: the Retrieval System. Its search capabilities are extremely powerful. You search one term at a time with options for right and left nuncation and left nuncation and left nuncation and left nuncation affect. A set is created that can then be combined with any other set using Boolean operators. Nesting in one command is not possible, although similar results can be obtained by combining sets can be obtained by combining sets.

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4 256K, 2 derve color syst	tem		\$2217	MULTIFUNCTION BOARDS		6 3M 10" cartridge 450"	134.00
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8 256K, 2 drive color syst	len .		\$2471	4 Advantage (AT compatible memory wigets.)	\$39\$	1 135 Wat Power Supply	\$ 90
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			\$3164	5 Biossom w 64K (64-364K, S.P.C.C opt PC net)	\$226	3 ISM PC compatible printer cable 4 5151 Kentronics kentoard	\$ 25
1D 512K, 12MB, floody, 3l	SCK drive, 2	OMB .	\$3600	5 Orthol PC Turbs w/256K, daughter card	\$670	5 Surge Protector PGI (4-6 outlet) 4:334,	
COMPAG				7 Ocasilie III memory econtion up to 4450	\$338	6 WARP SPEED LIGHT PEN (hers all mouse sthe & Loss)	\$196
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13 DESKPRD IL 2 drives			\$1921	9 PC shot nemon (0-364) 4"x5" shot card	\$132	PAINTLE	
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However, only two sets can be combined at once. Our complex search required nine separate steps. Searching is so fast on this system, however, that the entire process took slightly over 3 minutes. Extensive indexing makes these rapid searches possible, and you may browse the contents of the indexes

One peculiar problem is that FINDER treats common punctuation marks following words as characters. Thus "television." will only be retrieved if the search term "television" is truncated or followed

by a comma.

Once a search has been performed, you have several format choices in creating a report or bibliography. With FINDER, records can be printed in column format across the page or simply listed down the page. Specified fields can be selected for print, and field tags can be stripped from the records.

For more detailed editing, you save the results of a search to a file and invoke the Search Companion module. Search Comnanion should be adequate for most of your needs. You can design and store report formats that select, reorder, and sort fields, but additional text must be typed in record by record. A global search-and-replace function would be a useful addition. Also, you cannot process records of differing formats (such as journal articles and book chapters) together.

In general, FINDER lacks instructive error messages, and its error trapping is decidedly inadequate. On one occasion, when we designed a record that was too long, the program dumped us back into the operating system.

Finder Information Tools Inc. provides one manual for FINDER: the Retrieval System and Finderlink and a separate manual for Search Companion. The overviews of each package are excellent. It also includes a detailed glossary and index for FINDER: the Retrieval System. The Finderlink and Search Companion documentation, unfortunately, is unindexed, although glossaries explain commands and function keys. The most serious lack is tutorial materials, particularly for Finderlink. It would be helpful if all menu screens were diagrammed and an explanation of each option appended.

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#### BIBLIOGRAPHIES

#### Notebook

Notebook/Bibliography is a pleasing package that does everything a bibliographic manager should do, sometimes quite cleverly. Compared function by function with the more expensive packages evaluated here, it may not win any individual contests, but it is a contender for the decathlon

The excellent manual is one notable feature of this package. Tutorials alternate with reference sections and hints on constructing a database. The tutorials alone should give you enough familiarity with the one-word menu choices to use the system quickly and confidently.

Notebook is menu-driven, so creating a database is simple. You name a file when you call up the program. If the name matches an existing file, Notebook brings you that file. If there is no match, Notebook asks if you want to start a new database. A ves puts you into the record-creation editor, where you type in your field names

The program supports a maximum of 50 fields per record. Since you cannot establish subfields to handle, for instance, multiple authors, discrete fields must be established for any information you may want to manipulate in your output.

Database size is limited to what fits on one floppy disk or in a hard disk directory. The overhead required for indexing is about 10 to 12 percent of the data file size, so about 800 short bibliographic records will fit on one floppy disk

A full-screen editor makes manual input and record editing easy. You can import files, including those downloaded from on-line databases or created in Word-Star or dBASE III. Each field in the sourcefile record must be tagged. The manual recommends that you run through the import procedure with a test file of 5 records. After this test, importing the 200-record ABI/INFORM file took 90 minutes, including reformatting with WordPerfect. Several global changes can be made to

a Notebook data file. You can easily change field names. You cannot insert a new field into the middle of a record, but you can add a field to the end of a record and then change the field order by restructuring the file. The restructure function would come in handy if you wanted to



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adapt a previously created file to work with 1 the supplemental Bibliography package, which requires a field containing the author's last name and date of publication as the first field in the record.

Notebook offers all the major search features, but they're difficult to use. You must switch back and forth between the select subroutine of the editing screen and the view subroutine of the utilities screen

throughout your search. To initiate a search, you pick the select subroutine. You choose the field to search and the type of search to execute, which can be a string

beginning on the left of the field, a string within the field, or a greater-than or lessthan variation. Then you type in the term to be searched. Notebook asks if you want to refine that search with a second AND or OR condition. If so, you go through the routine again. Searched sets are saved as views of the database

You can search only one field per pass. so searching for the same statement in more than two fields involves establishing multiple views and then using the view subroutine in the utilities mode to merge them for further searching. Global searches are possible, but they retrieve citations for editing, not views.

Notebook does not search with anything near the speed of INMAGIC or FINDER. When the actual search time is added to the manipulations required. searches on several terms, in multiple fields, or with mixed ANDs and ORs can take several minutes. You can streamline the search process by creating a frequencyof-use list for words in any given field. You can use this list to help you pick more

frequently used terms for your search. For output, you can either use Notebook's default print formats or design your own. The custom-format routine is ingenious. Once in the format screen, you use the cursor keys and the alphanumeric keyboard to select fields and enter punctuation or text strings. The result can be saved to disk. Additional commands for indentation, margins, and spacing allow you to

create a polished product. As with several of the other packages, Notebook does not support underlining. Also, if you define a connecting phrase, like "edited by" or "in" for your citations, it prints the string even if the field to which the string is attached is blank,

Notebook also offers a manuscript interface through the Bibliography program, which creates a bibliography from your word processor text file and database. It also lets you run a manuscript through several databases (such as a book file, a journal file, or a conference-report file) and merge the resulting bibliographies. With this function, you can establish files, each





# Buy A Local Area Network For Less Than \$100 Per PC

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EasyLAN network software allows PC users to share printer and disk peripherals. PCs are connected by EasyLAN cables plugged directly into your PC's standard serial communication ports and EasyLAN can be used with digital PBXs. EasyLAN supports

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EasyLAV's performance meets your small office requirements to move word processing documents and spread sheets between PCs. For example. EasyLAV can move a 10 page document between two PCs, as a background operation, in

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#### EASY SPECIFICATIONS Each PC in the network requires an individual copy

of the EasuLAN software. 128k of memory, a serial communication port(s), and DOS 2.0 or above. For your convenience, EasyLAN diskettes are not copy protected. EasyLAN runs on all IBM PC models (PC, XT, AT, and Jr) and compatible PCs.

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### EasyLAN Office Network

communications and printing, All EasyLAN operations may be started from any connected PC. Printer sharing operates transparently with existing programs. Print files are automatically written to disk and scheduled for printing. Multiple printers

per PC may be designated for specific office tasks. For example, one PC can interface with Printer I for general purpose output, with Printer 2 for continuous-form letterhead stationery, and with Printer 3 for printing continuous-form invoices.

Disk sharing uses EasyLAN's COPY command, EZCOPY." to move files to and from PCs. Files are Expansion Kit. stored or retrieved from disk storage and the Directory is updated. The high-capacity benefits of just one hard disk can now be shared by several PCs. All communication operations are protected

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EasuL4N can be installed in less time than it takes to eniov your coffee break. Just plug the EasyLAN cables into existing serial ports. EasuLAN's PRINT, COPY and DIRECTORY commands are very similar to DOS

#### commands. EASY TO ORDER

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with a custom format, and create a bibliography from a manuscript with all the custom formatted citations interfiled. Notebook and Bibliography do all the grunt work of reference and bibliography formatting in manuscript preparation, although to produce a flawless product, you may want to add finishing touches with a word processor

Notebook/Bibliography is a bargain compared with other packages with similar features. It has style, and the things it can't handle are minor compared with what it can do.

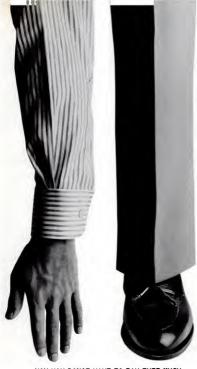
#### Conclusion

Our timed tests turned up several important differences among the three packages. Typing in records by hand was fastest with Notebook: 32 minutes for 20 records, as opposed to 46 and 50 minutes for FINDER and INMAGIC, respectively. However in the search tests, the expensive packages really showed their valuea search performed on a single term took fewer than 10 seconds in INMAGIC and FINDER but required close to a minute in Notebook This new genre of software has come a

lone way, but the perfect hibliographic manager still doesn't exist. INMAGIC and FINDER, coming from information professionals, are probably your best choices for working with large files. INMAGIC, although you need to know search commands in order to use it, is definitely easier to learn than FINDER. Its text editor, however, is a nightmare invented by a FOR-TRAN programmer.

Of the three bibliographic file managers reviewed here. FINDER is the only package that seriously addresses the importation of untagged records, but because of serious shortcomings in other areas, you would be better to wait for the new version. Notebook may be the best value; it is a solid little package that performs adequately, if not elegantly, all the essential bibliographic functions.

Katherine S. Chiang is a computerizeddata-services librarian, Howard Curtis is a computer projects coordinator, and Linda Guvotte Sa wart is un on-line coordinator at the Albert R. Mann Library at Cornell University.



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sult for expert advice "With Personal Consultant software," says Schreurs, "we found it far easier to teach our experts how to develop a system than teach a programmer to be an expert." In fact, the software's rapid expert system proto-typing and simple debugging features enabled the two scientists to demonstrate three different expert systems in as many weeks. Schreurs produced one for training new salespeople and a second to guide repairs and maintenance for the Center's X-ray defractometer.

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and services for you.

# Cleaning Up With SWEEP

Most DOS commands treat subdirectories like separate floppy disks. SWEEP lets commands range across your whole hard disk.

y isself. SWEEP is a program that does no useful work. If that sounds discouragingly like many of the utilities you wish you hadn't bothered to acquire, consider what SWEEP does when you use it with other commands. Most commands and organise work only within a single subdirectory. Used together with SWEEP, these commands can operate over the multiple subdirectories on your hard disk. A few examples will show how

useful this can be.

Suppose you'd like a complete listing, subdirectory by subdirectory, of all the files on your hard disk. There are several ways to do it. You could lissue the TREE to the Command with the CV parameter. But each of these procedures provides only the filenames, without the size, date, and time information you would get with the DIR command. To get the full story, own own of the CV parameter is the CV parameter. But each of these procedures provides and the DIR command. To get the full story, own own of the DIR command. To get the full story, own own of the DIR command for each oil souring the DIR command the DIR

On the other hand, if you enter

SWEEP DIR

you'll get the complete DIR command output for every subdirectory on your hard disk. Want the list printed out? Try

SWEEP DIR >PRN

Take another example. You're a Word-Strusser, and strewn all over your hard disk are bunches of. BAK backup files. You're down to 20,000 bytes of available space, and you'd like to get rid of all of them in one shot. The answer is simply

SWEEP DEL * . BAK

### 1985/No. 23

Or perhaps you would like to copy all your .ASM files. now spread over various subdirectories, into a single ASMFILE subdirectory. The command to do it is

SWEEP COPY *. ASM \ ASMFILE

While all the examples so far have used internal DOS commands, SWEPS also work with COM and EXE programs. Seve Holzer's LOCATE program (Fe Maguzine, Volume 4 Number 10), for example, does a text-ple, does a text-ple, does a lext-ple, does a lext-ple, does a lext-ple different points (Fe Maguzine, Volume 4 Number 10), for example, does a lext-ple different search through all files in a single subdirect port with a separate PATH DAT file for other directory searches, it's far easier to fire content of the private "IBM PC" on votal rand side by jest priging.

SWEEP LOCATE IBM PC

Another problem. Somewhere on your

hard disk is a very important file called RESUME. You need to find a new job quickly but you have no idea where your RESUME file is. It's simple to find it with SWEEP. Just issue the command

SWEEP IF EXIST RESUME PAUSE

and you'll get the message "Strike a key when ready ..." when SWEP lands on the subdirectory where RESUME resides. Although the IF construction is normally used in batch files, it can also be used on the command line by itself, so it is a legitimate parameter for SWEEP.

Indeed, you can also execute a whole batch file as a SWEEP parameter. For instance, suppose you create a file called

M YT MODEL OSS

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#### PROGRAMMING/UTILITIES

```
CLEAN.BAT, consisting of the lines
```

DEL * . BAK DEL * . TMF DEL *.OBJ

If you now issue the command

SWEEP CLEAN all the .BAK, .TMP, and .OBJ files will

be deleted. Suppose you want to create a file that

contains a list of all the subdirectories on your hard disk. Just set up a batch file called DIRLIST, with the single line

Then execute

CHDIR >> \ DIRLIST SWEEP DIRLIST

(The reason for putting the CHDIR >> DIRLIST line in a batch file is that if you had simply executed

SWREP CHOTE >> \ DIRLIST

from the command line, the SWEEP message as well as each directory would have been written to the DIRLIST file.)

#### Downloading SWEEP

If such a utility seems useful, you can add SWEEP to your arsenal of PC tools by typing in Figure 1 or by downloading the program by modern from the PC Magazine Interactive Reader Service (212)

```
100 REM -- BASIC PROGRAM TO CREATE SWEEP COM
110 OPEN "SWEEP.COM" AS $1 LEN = 1
120 FIELD #1,1 AS A$
130 CHECKSUM = 0
140 POR 18 = 1 TO
        LINESUM8 = Ø
159
160
        POR J% = 1 TO 8
179
           READ BYTE&
189
           CHECKSUM = CHECKSUM + BYTE&
198
           LINESUM& = LINESUM& + BYTE&
200
           LSET A$ = CHR$ (BYTE%)
219
           PUT #1
229
        NEXT J&
        READ LINECHECK&
23 @
249
        IP LINECHECK% <> LINESUM% THEN PRINT "Error in Line"; 299 + 1%
250 NEXT 1%
260 CLOSE
270 IF CHECKSUM = 55708 THEN PRINT "Successful Completion!" : END
280 PRINT "COM file is not valid!" : END
             233,
                                                              62,
                                                                      62.
300 DATA
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303 DATA
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384 DATA
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305 DATA
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	DATA	180,	48,	205,	33,	60,	2,	115,	9,	65
	DATA	186,		1,	180,	9,	205,	33,	205,	87
	DATA	32,	134,	196,	163,	137,	1,	188,	143,	99
	DATA	4,	187,	254,	9,			211,	235,	108
	DATA	180,	74,	205,	33,	115,	5, 44,	186,	74,	87
	DATA	1,	235,	224,	6,	187,	44,	Ø,	142,	83
	DATA	7,	43,	255,	190,	140.	1.		38,	
	DATA	128,	61,	ø,	116,	20,	86,	87,	185,	
	DATA	8, 42,	ø,	243,	166,	95, 255,	94,	116,	15,	73
	DATA	42,	192,	185,	255,	255,	242,		235,	158
	DATA	230,	7,	186,	93,	1,	235,	180,	131,	106
	DATA	199,	8,	137,	93, 62, 6,	148,	1,	140,	6,	70
	DATA	150,	1,	140,	6,	152,	1,	140,	14,	
	DATA	156,	1,	140.	14.		1,	140,	14,	62
	DATA	164,	1,	7,	160,	128, 6, 47, 22,	ø,	4,	3,	46
	DATA	162,	125,	ø,	198,	6,	126,	ø,	32,	64
	DATA	199,	6,	127,	ø,	47,	67,	184,	ø,	63
	DATA	51,	205, 184, 184, 33,	33,	136,	22,	126, 67, 139, 33,	1,	42,	62
	DATA	210,	184,	1,	21,	205,	33,	186,	42, 60,	93
	DATA	3,	184,	35,	37,	200,			25,	70
	DATA	205,	33,	4,	65,	162,	19,	205,	190,	67
	DATA	79,	3,	42,	210,	180,	71,	205,	33,	
	DATA	190,	22, 190,	1,	42,	210,	180,	71,	205,	92
	DATA	33,	190,	3.	1.	252,	172.	10.	192,	85
	DATA	116,	8,	138,	208,	180,	2,	205,	33,	89
	DATA	235,	243,	185,	244,	1,	180,	11,	205,	130
	DATA	33,	226.	185, 250,	129,	62,	137,	1,	10,	
	DATA	3,	114,	12,	178,	13,	180,	2,	205,	70
59	DATA	33,	114, 178,	10,	208, 244, 129, 178, 180, 22, 33, 208,	2,	205,	33,	187,	82
	DATA	152.	1.	197,	22,	148,	1,	42,	192,	75
	DATA	180,	75,	205,	33,	140,	200,	142,	216,	
	DATA	142,	192,	142,	208, 1,	188,	143,	4,	156,	
	DATA	42,	210,	184,	Ι,	21,	205,	33,	138,	
	DATA	22,	19, 33,	1.	128.	234	65.	180.	14.	66
	DATA	205,	33,	157,	186,	93,	1,	114,	12,	80
	DATA	186,	21,	1,	180,	93, 59,	205,	114,	115,	801
	DATA	10,	186,	116,	1.	180.	9.	205.	33.	74
	DATA	235,	98,	144,	139.	22.	173,	1, 1,	180,	993
6Ø 1	DATA	26,	205,	33,	128,	62,	175,	1,	0,	631

696-0360. If you'd just like to use SWEEP, download SWEEP.COM, using Xmodem. If your communications software does not support the Xmodem protocol, you'll have to download SWEEP .ASC, rename it SWEEP BAS, and run it in BASICA. This will create the file SWEEP.COM, ready for use.

If you have an IBM (or Microsoft) Macro Assembler, you can download

with the following three commands

MASM SWEEP: LINK SWEEP:

EXE2BIN SWEEP SWEEP.COM Ignore the "no stack segment" message

from LINK and delete the .OBJ and .EXE files when you're done, since they're no longer needed.

Even if you don't have the Macro As-SWEEP.ASM and assemble it yourself sembler (yet), you may want to download

the SWEEP.ASM file if you'd like to follow along with my discussion of how it works. And if you don't have a modem, you can simply send a self-addressed, stamped envelope requesting SWEEP .ASM to Technical Editor, PC Magazine. One Park Ave., New York, NY 10016.

#### SWEEPing Up

The syntax for SWEEP is simply SWEEP command



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361 DATA	117,	12,	186,	166,	1,	185,	16,	ø,	683
362 DATA	180,	78,	205,	33,	235,	4,	180,	79,	994
363 DATA	205,	33,	114,	37,	139,	30,	173,	1,	732
364 DATA	246,	71,	21,	16,	116,	240,	131,	195,	1036
365 DATA	30,	128,	63,	46,	116,	232,	139,	211,	965
366 DATA	180,	59,	205,	33,	131,	6,	173,	1,	788
367 DATA	43,	198,	6,	175,	1,	ø,	233,	63,	719
368 DATA	255,	129,	62,	173,	1,	143,	4,	116,	883
369 DATA	19,	131,	46,	173,	1,	43,	198,	6,	617
370 DATA	175,	1,	255,	186,	170,	1,	180,	59,	1027
371 DATA	205,	33,	235,	159,	186,	78,	3,	180,	1079
372 DATA	59,	205,	33,	138,	22,	139,	1,	184,	781
373 DATA	1,	51,	205,	33,	205,	32,	92,	ø,	619
								(F	igure I ends)

where command is any DOS internal or extemal command, or any .COM, .EXE, or BAT file you would normally be able to enter following the DOS prompt.

The command following the word SWEEP will be executed over all nested subdirectories of the default drive, beginning with the current directory. If the current directory is the root directory, SWEEP will do your whole disk. Otherwise, it will only sweep across a subset of your hard disk.

Before the specified command is exe-

directory in which the command will be executed. The cursor will pause briefly after showing the directory name, allowing you to break out of SWEEP by quickly pressing Ctrl-Break or Ctrl-C before the command begins. If the parameter you give to SWEEP is

not in the default directory, then there must be a path to the subdirectory containing the .COM. .EXE, or .BAT file you want SWEEP to use. This path can be set with the PATH command. (Actually, if you're using DOS 3.0 and above, you can simply preface the .COM or .EXE program name with the full directory name of its loca-

What's important to note here is that SWEEP takes no parameter other than the command to be executed. Thus, (1) your default drive must be the one you want SWEEP to work over; (2) your current directory on that drive must be that in which you want SWEEP to begin; and (3) the

command must be on a path that allows it to work on the default drive and subdirectory.

For instance, suppose you have two hard disks, C: and D:, and your current drive is C:. If you want a DIR listing of all your .ASM files on drive D:, you cannot issue the command

from the C> prompt. That would only do a DIR on the current directory of D: over and over again, each time with a new subdirectory of drive C:, which you do not even want swept. Simply change your drive to D: first, so you can issue your command from the D> prompt, instead.

Of course, for many commands and programs, using SWEEP will not make any sense. For instance, there would be no reason to run the command

SWEEP CHKDSK

And I hope you know enough not to try SWEEP DEL * . *

unless you want to wipe out every file

you've got. How It Works

The key to SWEEP's successful operation is the ability of DOS 2.0 (and above) to load a secondary version of the command processor COMMAND.COM together with a command to be executed. When SWEEP loads this version of COM-MAND.COM, it simply passes to it the SWEEP parameter.

Regular readers of this column will re-

called DDIR (PC Magazine, Volume 4 Number 22). That program used a secondary copy of COMMAND. COM to execute the normal DIR command but intercepted the directory information on its way to the screen to alphabetize it and put it in two columns. (Yes, SWEEP and DDIR will work together. Given from the root directory, SWEEP DDIR will produce a full. sorted, double-column directory of your entire hard disk. In this case, SWEEP will

be loading a second copy of COMMAND

.COM and DDIR will be loading a third

copy.)

SWEEP loads a secondary version of COMMAND.COM for every nested subdirectory on the default drive, beginning with the current directory. Each time COMMAND.COM returns control to SWEEP, SWEEP changes the directory and loads COMMAND, COM again, I discussed the method of searching for subdirectories in my Programming column on VTREE, the Visual Tree command (PC Magazine, Volume 4 Number 20). The difference is simply that SWEEP actually changes directories instead of simply listing them. You may want to look up the PC Magazine issues containing DDIR and VTREE for further details on some of the

techniques used in the SWEEP program. As a look at its assembly language code shows, SWEEP. COM begins by checking the DOS version to make sure that it's 2.0 or above. (If you're still using Version 1.1. you're dealing with a DOS that is virtually obsolete.)

Because we're going to be loading a secondary version of COMMAND.COM, call I used a similar technique in a program | we must next make memory available for that program. Since, as with most programs, DOS initially gives SWEEP all available user memory, SWEEP must actually deallocate the memory that it doesn't need. The Stack Pointer is first

brought in closer to the program code so the stack won't get clobbered. Then all the memory above our needs is freed up by setting BX to the topmost address (in segment or paragraph form) of the data we'll

be using and calling DOS with AH equal to 4Ah (a SETBLOCK call). Next, we must find out where COM-MAND COM is located. In DOS 2.0 and

above, the current drive and subdirectory of the command processor is kept in the program's "environment" area. This is an area in memory pointed to by the sport and area in memory pointed to by the sport and address given in offset 002Ch of SWEEP's Program Segment Prefix. Your current evironment can be viewed by executing the SET command. You'll notice that SET command. You'll notice that we will not be the service of COMMAND. COM. We'll use this fact to COMMAND. COM. We'll use this fact to search for the string, "COMSPEC="

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#### The key to SWEEP's operation is loading a secondary copy of COMMAND.COM together

with a command to be executed

find the address of the COMMAND.COM directory. In the environment, this is an ASCIIZ string, that is, a string of ASCII characters followed by a zero. This very string will help us execute a secondary version of COMMAND.COM

The actual execution of the secondary COMMAND.COM uses the DOS EXEC function call, 4Bh. This function call requires a parameter block that contains the information to be placed in COMMAND. COM's Program Segment Prefix when it is executed. This is the variable "Param-Block" in SWEEP.ASM.

If a secondary version of COMMAND. COM is given the parameter "C". Old is given the parameter "C". I closed by a DOS internal command or by a COM, EXE, or batch file, it will exceed that program and return control to the program that executed COMMAND. COM—in this case, SWEEP. The parameter to WREEP is almost the same parameter we want to pass to COMMAND. COM, exercity is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks the C. So, instead of program Seg-ercit is lacks

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FREE NATIONAL SALES HOT LINE CIRCLE 108 ON READER SERVICE CARD COMMAND.COM, we'll have to do a bit of housekeeping. First, there could be problems if someone tried to break out of SWEEP by using the Ctrl-Break key at an inopportune time. So, we get the current Ctrl-Break check state from DOS and then turn it off

Second, because SWEEP will be changing subdirectories, we cannot allow a simple Ctrl-Break termination. If the user breaks out, we want to be able to restore the original directory and the original Ctrl-Break check state. This is done by simply setting the Ctrl-Break exit address to the "Terminate" address of SWEEP itself.

Then, we call DOS to get the default drive and the current directory. These are stored for future reference.

The program code beginning with "MainLoop" will be executed for every subdirectory of the default drive, beginning with the current directory. MainLoop begins by getting the current directory so the SWEEP message can be displayed on the screen. After the display, SWEEP does a DOS call for keyboard status 500 times. This sounds like a lot, but it goes very quickly, and it provides the user his opportunity to break out of the program.

Prior to DOS 3 10, COMMAND

SWEEP does a DOS call for keyboard status 500 times, which provides the user an opportunity to break out of the program.

COM wrote a carriage return and linefeed sequence to skip to the next line when it was loaded. In one of those tiny changes that gives programmers such a gaunt look, COMMAND.COM Version 3.10 does not. So, we simply put one into SWEEP .ASM ourselves, ensuring that the command output will start on the next line.

Now it is finally time to load COM-MAND.COM. DS:DX is set to point to the ASCIIZ string for COMMAND .COM, and ES:BX is set to point to the parameter block containing the SWEEP command. AL is zeroed, AH is set for function call 4Bh, and Int. 21h performs the load and execution.

After COMMAND.COM executes the 1 command, control is returned to SWEEP. At this point the program attempts to prevent the crash that could be caused by a user who tried, in midstream, to change

the current drive or directory. If SWEEP cannot set the subdirectory to what it was before COMMAND.COM was loaded, then someone has been very malicious and clever. SWEEP just terminates, giving



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#### PROGRAMMING/UTILITIES

him a terse "abnormal error" message.

The first time SWEEP loads COM-MAND COM, the SWEEP parameter is executed in the current directory of the default drive. Now we have to begin the

search for nested subdirectories. Subdirectory nesting can be 32 levels deep. For this reason, you'll notice that space has been reserved at the bottom of the program for 32 Disk Transfer Areas (DTAs) of 43 bytes each. These DTAs are used for successive file searches with function calls 4Eh (Find First File) and 4Fh (Find Nest File). The DTA contains the name of the found file, its attribute, some other information we don't need, and data

needed by DOS to continue the search.

Normally, you would not change the
DTA when doing searches. Here, however, each subdirectory we find is going is searched for additional nested subdirectories. So we switch the DTA to the next one
higher in kevil and begin the search all over
again. When we exhaust a particular directory of further nested subdirectories, we
back up one level to the next-lower DTA
and continue the search from the search from the

For each new subdirectory we find, we branch up to the MainLoop pointer to display the SWEP message and execute COMMAND.COM with the SWEP parameter for that subdirectory. When we run out of files in the lowest level, we're done and must then branch to the Terminate label.

Terminate does the final clean-up. While a normal termination would not require restoration to the original subdirectory, a termination due to an error or a Ctrl-Break exit would. Finally, the Ctrl-Break check state is restored to the value at entry to the program.

#### How Useful Is It?

At the beginning of this article, I gave several examples of how SWeEP can be used with other commands and programs to make your life easier on the PC. I'm sure there are many other uses for it that I haven I even dreamed of. I'm interested in hearing of ingenious SWEEPs over your hard disk. Those of us who create tools like to know what others build with them.

Charles Petzold is a frequent contributor to PC Magazine.

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# Spreadsheet Clinic

This forum lets readers exchange the ingenious solutions and timesaving hints that make their spreadsheets and integrated software packages work better.

#### Entering Dates the Easy Way

If you find 1-2-3's date format cumbersome, the macro in Figure 1 should make dates easier to use. Move the cursor to where you want your date and hit Alt-D to run the macro. Then enter the numbers of the month and the day, separated by a comma. Hit the Enter key and, presto, your date aponears.

your date appears. The merce works by copying a date template (in cell D5) to wherever you have template (in cell D5) to wherever you have template (in cell D5) to where you have been been as the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the contr

Devon Block Houston, Texas

We've seen other date utilities in Spreadsheet Clinic, but Mr. Block's is the best to date. However, there is one thing you should be cautioned about before using it.

Since the macro works by counting its way back along the characters entered in cell D5 and then wiping some of them out, D5 may contain no more characters than the macro expects. For example, if your

template date contains a two-digit month or day—for example, @date(85,12,25) instead of @date(85,1,1), which is what is really in D5—the macro won't work. As long as your template always contains Jan. 1, you'll never get into trouble. A shorter version of this macro is listed

/c05""(EDIT)(LEFT)(BS)(BS)(BS)(?)"

#### Hiding Spreadsheet Notes

(Editor's Note: In Spreadsheet Clinic of August 6, PC Magazine, Volume of Number 16, there was a tip from John Schloszer on hidling annotations within a 1-2-3 gereadsheet. Mr. Schloszer makes a special column one character wide for notes. The notes can be quite long, but if they begin with a leading space, they will the curso to that cell and the note appears in the control panel.)

In your response to John Schlosser's tip, you pointed out that if the columns to the right of the note are blank, the note text will spill into them. You can avoid this by starting notes with \ and as many spaces as there are characters in the notes column. The entire spreadsheet may be blank, but you still won't see the notes un-

til you move the cursor to them.

John Freeman

Winnsboro, South Carolina

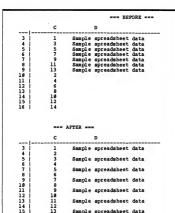
I didn't expect this tip to work if the adjacent column was wider than the notes column—but was pleasantly surprised to find that it does. This is a smart way to make use of a quirk in 1-2-3's repeating label-pre-fix character.

Inserting Blank Lines in a Spreadsheet Sometimes I have to insert blank lines hetween the existing lines of a spreadsheet. It's easy enough to write a macro to insert them, but if there are many blank lines to insert, the macro will take a long time to execute. Also, when you use the Insert command, it will put new rows into the entire spreadsheet, whereas I may want more space in just one (vertical) part of the worksheet and may prefer to leave the rest of it unchanged. Figure 2 shows a technique for 1-2-3 or Symphony that could work with any spreadsheet with a sort function. Let's assume that I want to insert blank spaces between the spreadsheet data in column D of the "Before" illustration; when I'm finished, the data should look like the "After" illustration. The first step is to move any data in rows 10 through 16 of column D out of the way to make as many blank rows as 1 have rows of spreadsheet data.

Next 1 use the Lotus /Data Fill command to enter a number series in cells C3 to C9. I start with 1 but choose an increment of 2, so that 1 get the odd number series 1 to 13. Then 1 go End-Down to get to

C D
4 \D /cD5~~{EDIT}{LEFT}{LEFT}{LEFT}{LEFT}{DEL}{DEL}{DEL}{?})
5 01-Jan-85

Figure 1: A 1-2-3 macro that makes it easy to enter dates in the correct format.



Flaure 2: Filling column C with odd and even number sets yields a simple technique for double spacing a 1-2-3 worksheet.

the bottom of the sequence, and use | /Copy. End-Up Down Return to make an exact copy of my odd number series in cells C10 to C16. This is an intermediate step, the usefulness of which will be clear later

14

16

Now I move to C10, the first cell of the sequence I just copied, and do another /Data Fill. I hit the backspace when 1-2-3 offers the previous data fill range and then go End-Down Return. It was the previous copy step that let me specify the fill range with End-Down. It's important that the two number sequences be the same length. they are. 1-2-3 now proposes a data fill starting value of 1, but I enter 2 and hit Return twice. My new sequence in cells C10 through C16 is all even numbers, and the screen looks exactly like the "Before" illustration.

Now, all I need to do is sort columns C and D with column C as the primary sort key. The odd and even numbers in column C fall into sequence, and in addition, my data is double-spaced, as shown in the "After" illustration, Moreover, I haven't inserted a single new row into the spreadsheet; only the part I sorted has changed. and this is the easiest way to be sure that Thus, if I had data in columns E and be-

vond, it would remain untouched.

If I ever need to insert two blank lines between each row of data. I can use the same technique but make three data fill sequences, using step 3 instead of step 2. I start the first sequence with 1, the second with 2, and the last sequence with 3.

Richard Holliday Parkton, Maryland

#### Macro That Names Ranges of Unknown Lengths

You may sometimes find you have to write a 1-2-3 macro that assigns a name to a range of cells. For example, you may need to name the results of a data query so that you can sort or copy the output.

Most of the time this is easy: Send the cursor to the beginning of the range and use {End} {Down} {End} {Right} to find the limits of the range. You can run into problems, though, if the macro tries to name a range that is only one row deep. In this case, if you go to the first (and only) row in the range and use {End} {Down}, you could send the cursor to the far depths of the worksheet

The macro in Figure 3 solves this problem. You can use it to name a range of only one row. For the trick to work, though, you have to start naming the range one cell above the actual area you are interested in. In this example, I start the macro from cell C4, even though the data query output I want to name begins in cell C5. What's in row 4 doesn't matter-it just provides space above the cells I want to name.

The macro starts off normally. It sends the cursor to C4 and uses END and the arrow keys to define the range. If the macro stopped there, though, the range would include the unnecessary row above the range. Cell D14 in the macro gets rid of this by using a technique to move the "free cell," While you are "pointing" to define a range, each time you hit the period (.) key, the free cell moves clockwise to another corner of the range. The two periods in cell D14 move the free cell from the lower right-hand corner to the top of the range. The {Down} command then takes row 4 out of the range, and the final carriage return defines the range.

Although this technique works with one-row ranges, you can still run into problems if there are no records that match

#### SPREADSHEET CLINIC

your data query and the output area is blank. Your macro may need to test the output area to make sure it contains data before it calls this routine.

Chuck Doherty South Dartmouth, Massachusetts

(End) {Down} is a very handy command, but it can take you further than you expected and this macro solves the problem nicely. And as long as you are working with data query output that is at least several columns wide, you won't have to worry about {End} {Right} taking you on a surprise joy ride.

But what happens if your target range is just one cell? Mr. Doherty's macro can be quickly modified to deal with that problem, too. Just make the starting cell one column to the left as well as one row above the target range and change cell D14 to read: ..(Down) {Right}

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out of your submission to ensure against damage in transit.

Mail your contribution to Spreadsheet Clinic, PC Magazine, One Park Avenue, New York, NY 10016—or, if you prefer, send them to our electronic mailbox via MCI mail.



Figure 3: A 1-2-3 macro that names a range containing only a single row.



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#### EDITED BY DAVID OBREGÓN

# Power User

Push your hardware and applications software to the limit with these productivity-enhancing tips from readers.

PC Magazine Index on Disk The indexes to PC Magazine, available from the Interactive Reader Service (IRS), contain a wealth of data. The value of this data can be enhanced with the command file PCMAGNDX.PRG, which loads the index files into a dBASE data file. Once in dBASE's .DBF format, the indexes become powerful tools for tapping the treasures of PC Magazine. Any article can be located in seconds by author, subject, or title, and groups of articles by the same author or covering the same topic can be located quickly.

For readers who are not familiar with the index text files, they are set up as paired A and B files for each section of an index. The A file contains an article's title description, volume, issue number, and page number. The corresponding B file contains the author's name and the category of the article, such as graphics, net-

works, and so forth. On the IRS, the files are identified by the format VOL#A?.TXT and VOL#B?.TXT, where "#" indicates the volume of the index (Volume 3 or 4), and "?" is a code indicating the range of issues included within the file (1 for issues 1-5, 2 for 6-12, and so on). Thus, the file pair VOLAA1. TXT and VOLAB1. TXT form a

ume 4 Numbers 1 through 5. Before using PCMAGNDX.PRG (see Figure 1 for dBASE II and dBASE III), you must download paired copies of the index files from the IRS. Then, using any ASCII text editor, delete from both files the first five lines, which contain page and column headings (otherwise, these headings will end up as records in the resulting dBASE file)

Next, use dBASE to CREATE the three

complete index for PC Magazine's Vol-

DBF files TEMPA, TEMPB, and PC MAGAZINE . NOVEMBER 12, 1985

PCMAGNDX (see Figure 2). Use the exact field lengths shown, as they are critical.

Finally, run PCMAGNDX, PRG by typing DO PCMAGNDX. The result will be the file PCMAGNDX.DBF, containing the combined information from the original A and B text files. The program will automatically append new index file pairs to the database you've already created as new indexes become available on the IRS. The files TEMPA. DBF and TEMPB. DBF will be emptied of records but will remain on the disk so they need not be recreated each time PCMAGNDX. PRG is run.

John L. Diehl Springfield, Virginia

There's a wonderful irony here. The index files used on our Interactive Reader Service (telephone number (212) 696-0360) are formatted as straight ASCII files in order to make them usable to as wide a range of readers as possible. However, the original source for the index files was a dBASE II database we maintain in our offices for our own use. Thus, Mr. Diehl's elegant program allows you to re-create the database for yourself in a form that's very close to the original we ourselves use.

For dBASE III users, differences in code syntax for each affected line have been added to the right of the program. Replace the line on the left with the one on the right. In order to run PCMAGNDX.PRG, you must have matching pairs of index files from our Interactive Reader Service. Please follow the IRS instructions for downloading these files. For maximum convenience, we will also be adding Mr. Diehl's program to the IRS.

#### Calculating Square Roots A recent programming project required the

calculation of square roots in a dBASE II



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command file. After some searching, we came up with an old Pascal routine that was easily converted into dBASE code (see Figure 3). will be accurate to at least eight decimal

Simply STORE the number you would

like the square root of to the memory variable "number" and execute the procedure with DO SQRT. The result will be returned in the variable "sqrt." This result

* PCMAGNDX.PRG--Converts PC Magazine's Index Files to dBASE Files.

places-perhaps more-depending on the precision of the initial number. The program will dCONVERT to III.

Randy Dufault and Jim Kilian Sioux Falls, South Dakota

```
* J.L. Diehl, Springfield, VA
* For dBASE III, substitute text within brackets for line of program.
                                         *[ SET HEADING OFF ]
                                        *[ SET SAFETY OFF ]
*[ CLEAR ]
ERASE
SET TALK OFF
ACCEPT "Enter Volume Number (the First # in VOL#A#.TXT) " TO V
ACCEPT Enter Issue Code (the Second # in VOL#A#.TXT) " TO N
ERASE "[ CLEAR ]
£ 12,25 SAY "Processing - Please Wait"
SELECT PRIMARY
                                         *[ SELECT A ]
USE pcmagndx
SELECT SECONDARY
                                         *[ SELECT B ]
USE tempA
APPEND FROM VOLEV. A&N. . TXT SDF
GO TOP
6 13.25 SAY "CREATING RECORD: "
DO WHILE . NOT. EOF
  STORE $(title,2,32) TO Mtitle
                                        *[ STORE SUBSTR(title,2,32) TO MLitle ]
  STORE $(subject,2,35) TO Msubject *[ STORE SUBSTR(subject,2,35) TO Msubject ]
  STORE vol TO Mvol
  STORE no TO Mno
  STORE page TO Mpage
  SKIP
      DO WHILE . NOT. EOF .AND. vol="
           STORE TRIM(Mtitle)+title TO Mtitle
           STORE TRIM (Maubject) + subject TO Maubject
           SKIP
     ENDDO while .not. eof .and. vol=" 2 spaces "
ECT PRIMARY *[ SELECT A ]
  SELECT PRIMARY
  € 13,42 SAY STR((#+1),4,8)
                                       *[ @ 13.42 SAY STR (RECNO () .4.8) ]
  APPEND BLANK
  REPLACE title WITH TRIM(Mtitle), subject WITH TRIM(Msubject);
       vol WITH Mvol, no WITH Mno, page WITH Mpage
  SELECT SECONDARY
ENDDO while .not. eof
@ 13,25 SAY "Adding Authors and Categories"
"[ SELECT C ]
USE tempB
APPEND FROM VOLAV.BAN..TXT SDF
DELETE ALL FOR category=" " .AND. author=" "
PACK
SELECT PRIMARY
                                        *[ SELECT A ]
GO TOP
                                        *[ SET RELATION TO RECNO() INTO C ]
SET LINKAGE ON
                                       * REPLACE ALL author WITH C->author;
REPLACE ALL author WITH S.author;
                                       category WITH C->category |
*[ SET RELATION ]
category WITH S.category
SET LINKAGE OFF
@ 13,25 SAY " HOUSEKE
                      HOUSEKEEPING
                                        *[ SELECT B ]
USE tempA
                                       *[ ZAP ]
*| DELETE THIS LINE FOR DBASE III ]
DELETE ALI
PACK
SELECT SECONDARY
                                        *[ SELECT C ]
DELETE ALL
                                        *[ 2AP ]
PACK
                                        * DELETE THIS LIKE FOR DBASE III 1
ERASE
                                       *[ CLEAR ]
CLEAR
QUIT * EOF pcmagndx.prg
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Converting Pascal routines into dBASE code sounds like an avenue with all sorts of possible applications. There are thousands of Pascal routines to solve many of the problems dBASE programmers face. making this one way to avoid rediscovering the wheel. The syntax of each of the two languages is similar enough to make Pascal an attractive source of ideas for .PRG files. Expect a lot of debugging. though

I've modified the program listing in Figure 3 slightly by adding both an INPUT line at the top and a "?" line at the end. These lines make the program usable as a standalone method for obtaining square roots. To use the routine within a more complex application, you can drop these lines if the preceding code creates a memory variable called "number."

Converting Symphony Files Having just converted a 300K-byte Sym-

phony file for use with dBASE III. I've discovered that the process entails more than either Lotus's or Ashton-Tate's documentation would lead you to believe. Basically, the problems stem from the differences

The syntax of dBASE and that of Pascal are similar

enough to make Pascal an attractive source of ideas for PRG files.

between dBASE II and III. These are the

problems I experienced: Problem 1: At present, Lotus provides a function, Translate, to go from either Symphony or 1-2-3 to dBASE II. Presumably, one should be able to use Ashton-Tate's dCONVERT utility to convert the dBASE II file upward to III. No so! Apparently the Lotus conversion lacks something, be-

cause the dCONVERT utility will not convert the data file as delivered by the Lotus Translate facility.

Solution: After converting a Lotus file via the Lotus Translate facility, enter dBASE II (assuming you have dBASE II), USE the file, the QUIT. This resaves the file, adding whatever was missing to make it a proper .DBF file. dCONVERT will now be able to successfully convert the file upward to dBASE III.

Problem 2: The Lotus Translate facility is supposed to allow you to convert either a complete worksheet or a subset range within the worksheet to a .DBF file. Unfortunately, in the original release version of the Translate facility, the range conversion option contains some bugs that prevent it from working properly (confirmed by Lotus Support).

Solution: You must first do a File Extract of your spreadsheet for the desired range, then use Translate's worksheet op-

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Figure 2: Data file structures required by the PCMAGNDX.PRG index program.

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tion to convert the Extract. (This problem | may be fixed in the forthcoming version of Symphony.)

Problem 3: Prior to converting a Lotus database, all numeric record fields must be individually formatted, via the Cell Format option, to the number of decimal places required. The Global Format option within Symphony is not sufficient for decimal place designations.

If you've used the Global Format option to set decimal length. Translate will truncate all decimals into a whole number.

Solution: Format all database cells to their required decimal length prior to attempting any conversion into a .DBF file.

Problem 4: Numeric Lotus files that contain a label prefix will not convert pro-

perly into .DBF files. Solution: In order to check each database cell within a spreadsheet for an unwanted label prefix, the following Sym-

phony macro comes in handy: {down} {recalc C8} {if +C8="L"} {beep} {quit} {branch \ X}

Note: The macro is named \ X and the cell C8 contains the formula

@CELLPOINTER("TYPE").

Dan Domzalski Buffalo Grove, Illinois

Unfortunately, as Mr. Domzalski points out, the solutions listed here require you to have both versions of dBASE in order to successfully use dBASE III to manipulate Symphony data. Lotus Development Corp. has promised to correct this deficiency in the upcoming version of Symphony. If you have the original version of the Lotus program, check with the compa-

ny for its uperadine policy. Share Your Power

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10016. * SQRT,PRG -- finds square roots. (dBASE III COMMANDS IN BRACKETS) * By R. Default & Jim Kilian ENTER WITH number = NUMBER RETURNS WITH sqr = SQUARE ROOT

. (SET HEADING OFF) . [SET SAFETY OFF) SET TALK OFF INPUT "NUMBER? " TO NUMBER STORE NUMBER * 1.00000000 TO LONUM

STORE (1 + LQnum) / 2 TO LQs STORE LQnum * .00000001 TO LOtest STORE N TO LOdone * (STORE .N. TO LQdone) DO WHILE .not. LOdons

STORE LQs * LQs - LQnum TO LQhold IF LOhold < 0 STORE 0 - Lohold TO Lohold ENDIF

IF LObold & LOtest STORE Y TO LOdone * [STORE .Y. TO LOGORE] ENDIF

STORE (LQs + (LQnum / LQs)) / 2 TO LQs ENDDO STORE LOS TO SOR

? "ANSWER: 22 SOB RELEASE ALL LIKE LO* SET TALK ON RETURN

Figure 3: This Pascal-based program will calculate the square root for any number entered.

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# User-to-User

Readers share their favorite tricks for getting the most out of DOS, BASIC. and their systems in general.

Better DOS Colors

After working with a monochrome display for the past few years, I recently started using a color monitor. From the beginning, I disliked the poor resolution of the characters, as well as the white-on-black letters. To solve part of the problem, I wrote a small program called CSET.COM (see Figure 1) that changes the foreground, background, and border colors

Some people in the office didn't like the colors I had chosen (high intensity white letters on a blue background with a red border). Instead of changing my program, I wrote a Turbo Pascal program that allows each user to see his color combination before creating the CSET.COM file.

The DOS CLS command wines out the colors set by CSET, so instead of using CLS, use CSET to clear the screen.

> Steve Shover Rydal, Pennsylvania

The Pascal program was indeed long, so we adapted a short BASIC program called MAKECSET.BAS (see Figure 2) to create the CSET.COM file and allow users to se-

lect their own colors. While we've published instructions for creating similar .COM files in past Userto-User columns, MAKECSET.BAS lets

SUB AX.AX PUSH DS PUSH AX MOV AX,0003 ;80x25 graphics mode INT :video io interrupt call MOV AX.ØBØØ set color palate BX.000* MOV set background color INT ;video_io interrupt call MOV AX.0600 scroll page up MOV CX,0000 supper left screen coordinates MOV DX,2050 lower right screen coordinates set background, foreground MOV BH, ## INT video_io interrupt call MOV AH, 02 ;set cursor position DX.0000 MOV screen coordinates MOV BH.00 page Ø INT 10 video io interrupt call

Flaure 1: Assembler code for CSET.COM. To enter your own border color, replace the * with a hex number from 0 to F (where 1 = blue, 2 = green, ..., F = high-intensity white). To enter the foreground (text) and background colors, replace the ## with a two digit hex number from 00 to FF; to calculate this number, multiply the background color by 16 and add it to the foreground, and convert the total to hex-or simply use the individual hex values of the background as the first digit and the foreground as the second digit. Once you replace the * and ##, you can enter this with DEBUG's miniassembler; if you do, leave out the semicolons and comments.



RETE



#### USER-TO-USER

3.18 RETURN
Figure 2: MAKECSET.BAS program that creates a customized CSET.COM DOS color-setting
program—and lets you select the individual colors you want.

use DEBUG. In addition, previous color programs have used OUTs, which work but are frowned upon by some serious programers; all of CSETs assembler in-structions are knober. Incidentally, Turbou users may download the long Pacient Survey Code Business of the Magazine's Interactive Reader's Serice bulletin board; the long version contains a far more sophisticated color-choosing routine in MARECSET BAS is the heart of the Pacaci program—it works fine

Several issues back User-to-User connaimed instructions on getting into low-resolution mode. I experimented with the 6485 graphics chip and discovered another mode, virtually identical to the low-resolution mode, which produces an 80 by 50 screen on the color/graphics board. You can enter this 'very low resolution' mode with the following BASIC code (through line 160). (Ed. note: We added several

lines to this routine so that something

Low-Resolution Magic

but is small to save space.

| would appear on screen. In the original is well to save space. | would appear on screen. In the original is with "Creation SOURCE COM, Bearing and Table 1975. | which is well as the property of the property

Figure 3: KALMAKRI. BAS and KALMAKR2. BAS programs that create low-resolution kaleidoscopes. Use on color/graphics boards and RGB motiors only. Once you've created the .COM files. F9 and F10 speed up and slow down the action; any other key exits.

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(Figure 3 ends)

program, nothing did.) To undo this and stop, just hit the Escape key.

100 SCREEN 0,1:WIDTH 40:KEY OFF 118 FOR N=1 TO 4 128 READ I,D

130 OUT 6H3D4.I:OUT 6H3D5.D 148 NEXT

158 DATA 4,63,6,58,7,56,9,3 168 FOR A=1 TO 7

188 PRINT STRING\$ (48,222); 198 COLOR A+8 288 PRINT STRINGS (48,221); 218 NEXT

228 IS=INKEYS:IF IS="" THEN 228 238 IF IS<>CHR\$(27) THEN 168 248 SCREEN #1CLS

In this mode the screen displays 50 rows of half-height characters, although the color/graphics board thinks it is set up for a 40 by 25 character screen. The attribute byte determines the color of the left and right PELs-the left PEL is in the low nibble (the right-most 4 bits of a byte), and

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the right PEL in the high nibble (the leftmost 4 bits). Since this uses only 4K bytes of the screen buffer, you can work with as many as 4 screens at any one time.

The two KALMAKR1.BAS and KAL-MAKR2.BAS programs in Figure 3 produce .COM files that demonstrate this low-resolution mode by creating two kaleidoscopes. Once you've produced the .COM files, you can speed up or slow down the action by hitting F9 and F10 and can exit by hitting any normal key.

Eric D. Plambeck Carpinteria, California

While these are interesting graphics demos, they're a bit tedious to type. And, as mentioned in the assembler listing that accompanied the programs, they were inspired by BASIC programs published in Graphics for the IBM PC by Dan Illowsky and Michael Abrash, However, Mr. Plam-

beck points out that his programs are written in assembly language.

#### Decimal Placer

When writing applications that input dollar figures, it's best to allow users to enter numbers without decimals and then have the program convert the numbers to the specified decimal defaults, while allowing the user to override the default decimal, if desired.

I've developed a user-defined function

(see Figure 4) that does this. The number to be converted must be input as a string, which is then passed along with the specified decimal default to the function. The decimal default can be specified as either a positive or negative number. Positive numbers move the decimal to the left and negative numbers move the decimal to the right. If the number to be converted includes a decimal point, then no conversion is performed.

The function can return either single- or

- 188 * ONWERT, BAS demo program by Scott Russell
  118 DE PROMINIATE, AND GENERAL SEX, 30 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 ** 10 *
- FOR DECIMALPLACES+® TO LEN(NUMBERS)+2 PRINT "Using";DECIMALPIACES; "decimal place(s), the converted number is "; PRINT FNDECIMAL*(NUMBERS,DECIMALPIACES)
- 176 NEXT+GOTO 128

Figure 4: CONVERT program to convert numbers to specified decimal defaults.

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#### USER-TO-USER

double-precision numbers by omitting or including the # in the function name. Scott Russell

Winter Park, Florida

User-defined functions, especially ones as complex and powerful as this, can be real labor-saving devices in programs. The only problem is that since they have to be strung together in one long line, correcting or even just entering them can be thorny.

#### Ultimate Stripper

I hate to bring up the subject of BASIC leading blank strippers again, but there is an even better way using a feature of the MIDS function. If the third argument is

188 ' SSTSTRIP. BAS - by Mark Punkin 118 DEF PNST\$(2)=MID\$(STR\$(1),2+(1<8)) 128 POR A=-1 TO 1 STEP .5 128 FOR A=-1 TO 1 STEP .5 138 PRINT "OLD: ***";A;"***";TAN(28); 148 PRINT "NEM: 888";FRSTS(A);"888"

Figure 5: STRIPPER BAS program to remove unnecessary blank spaces surrounding

omitted, MID\$ returns all characters from the position indicated by the second argument to the end of the string-which means you don't have to use either the LEN or SGN functions, as suggested by other readers

The FNST\$(Z) stripper in Figure 5 works because the expression 2+(Z<0) evaluates to 2 if Z is 0 or greater and 1 if Z is negative. Thus, MID\$ will strip the leading blank from STR\$(Z) only if Z is not negative.

I hope this contributes to and puts an end to blank strippers.

Mark Pankin Arlington, Virginia

It does. We use this final DEF FN trick in most of our BASIC programs.

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# Reviews in Brief

# Clearing Up a Cluttered Desk: Šeekeasv

BY VINCENT PUGLIA

Most database management programs are overkill for simple day-to-day needs. In lieu of using a complex DBMS, you end up covering your desk with scattered slips of paper, listing everything from newly acquired

the word being searched is database, the report would display items that contained date, abated, and baseball as well.

In addition to the search capability, the program allows you to create a data file and then edit or delete any items within it. Although items are limited to

MENT "TRACE WIRES INC." - CALL 444-3321 - AURLIES TICKETS. SON'S BIETHNAY IS NOV. 14

Seekeasy displays both exact and near data matches.

phone numbers to a reminder of a specific programming tip in PC Magazine. Unfortunately, with such a catch-as-catch-can system, you can never find what you want when you need it. Seekeasy by Correlation Systems may solve your problem and clear your desk at the same time. It is a free-form filing program that enables you to enter nonrelated items as they occur to you (that is, haphazardly) and then retrieve them easily. The search facility is Seek-

easy's major strength. With it, you can search any text file for any phrase. Up to 100 occurrences of the phrase are displayed within a two-line couplet. Making searches as wide as possible, a Seekeasy search also includes any items that contain at least three letters of the search phrase. For example, if two lines, you can group them together by including a unique word or symbol within each couplet. In this way, you are assured of seeing all related items when searching. Other modes permit you to list all the contents in the file, check the number of bytes available on the disk, and delete or pack the data file.

The program can be executed from DOS in one of three ways: by program name; by program name and the phrase being searched; and by program name, filename (if more than one Seekeasy data file exists), and the phrase being searched. One nice feature is the flexibility allowed in the search syntax. You can enter either the phrase or the file first. For example, typing Seekeasy B:RE-VIEW.WS "hard disk" is the same as typing Seekeasy "hard disk" B:REVIEW.WS.

With non-Seekeasy ASCII text files, you are limited to three modes: search, list, and check file space. Since the program looks at only the first 7 bits of a word, most WordStar document files can be read as is. The program arbitrarily lists the files as two-line couplets

Seekeasy might be indispensable in some future version. As it is now, though, there are certain limitations that make it only a useful utility. First, the program is unable to use wildcards when calling up files to be searched. This limits you to specifying a specific file to be searched. If you don't, the program looks for its own default data file

Another drawback is that the program does not allow you to

change the search to another file from within itself. You must first exit to DOS and then reexecute the utility. Finally, it would be nice to have Seekeasy RAMresident, allowing one to search through a source document while writing a paper or report. Despite these limitations.

Correlation Systems 81 Rockinghorse Rd. Rancho Palos Verdes, CA (213) 833-3462 List Price: \$87

though, Seekeasy is an excellent

Requires: 128K RAM, one disk drive, PC-DOS 2.0. Circle 670 on Rearter Service Care

utility.

# Sometimes Simplicity Is All You Need: PC-DRMS

BY VINCENT PUGLIA

Despite what some P.R. types would have you think, not evervone needs dBASE or any other umpteenth-generational DBMS just announced. For many people, an easy-to-learn, simple-to-use relational database would do quite well. PC-DBMS is just that-a database manager that only takes a few hours to master and offers some fairly sophisticated features as well. Also, as a user-supported program, PC-DBMS is well



The results of a conditional search for data using PC-DBMS.

within the reach of everyone.

Version 1.0 of the program allows a maximum of 32,767 records per table and 999 fields per record (and deleted records count toward the maximum). Fields can be of character, numeric, or filler data types. Filler fields, ignored by most of the program's features, are there solely to facilitate importing data files from other programs so that the number of fields matches exactly. You can sort up to five fields at a time and compare up to ten fields with the use of the WHERE command and the conditional AND and OR operands. There are also eight supplemental comparison operands, two of which allow you to compare for the inclusion or exclusion of a character, word, or phrase. You can also

or more data files to a new one. PC-DBMS divides the screen into three areas: The upper window is a word-wrapping text editor used for entering commands; the lower window acts as the report screen, and the middle ground displays the program messages and report headings. The program makes adequate use of the PC'S Tab.

ioin the result of a search on two

keys. F7. for example, executes the command in the text window, and F3 repeats the last command executed. On-line, context-sensitive help is always available with the F1 key.

Creating a database involves completing two screens. The first defines the name of the table, its filename, an optional description, and the type of character to be used as an end-of-record marker. You can choose a null, a carriage return, or a carriage return with a line feed for the end-of-file marker.

The second screen defines the name, type, size, and description of the field, as well as whether it is an index field. If you aren't sure whether a field should be indexed, you can delay your decision and key it afterward. You can also add additional tables at any time.

PC-DBMS
Kware Inc.
P.O. Box 16206
Arlington, VA 22215
Suggested
Contribution: \$80
Requires: 192K RAM, one
disk drive, PC-DOS.
Circle \$72 on Reader Service Card



rectory's contents in three rows. If there are more files than can be accommodated in this window, you can scroll to a second

page. You can also devote the entire left side to just this file window. The third window displays

disk-staus information. Among other things, it lists the number of bytes available on the disk, it lists the number of bytes available on the disk, the number of programs that match the sumber of programs that match the search criteria and their sizes, the number and sizes and the number of files that are and the number of files that are and the number of files that are and the number of files that are and the number of files that are and the number of files that are and the number of files that are and the number of the number of the number

Commands are listed at the bottom of the screen, and most operations require a single key-stroke. ATBEE allows you to tag files for renaming, deleting, copying, or executing. You can view documents in either ASCII or hexadecimal format and set markers in them for future use. The program also permits the renaming of subdirectories and volume labels, as well as displaying and changing a file's astributes. This last feature effects

tively allows you to hide files in

the same manner as DOS's own hidden files

One of XTREE's nicer features is the ability to rename, copy, or delete multiple files across directories in one operation. This operation is performed with a SHOW ALL FILES command. Invoking the command displays all similar files on-disk regardless of the

directory in which they reside.

You can then scroll through the listing and tag any files for the desired operation.

XTRÉE's manual is good for utility program documentation. The text not only explairs how a particular feature works, it also provides potential uses. In addition to the clearly written instructions, the manual includes screen shots, error messages, and appendixes.

XTREE's main drawback is its size. It occupies 147k bytes of RAM during normal operation and 47K when executing a program. This means you need quite a bit of memory to use it effectively. It also displays some incompatibilities with memory-resident programs such as SideKick; they tend to kick XTREE out of residency.

One feature I would love to see in a future version is the ability to toggle tagged files. Such a feature would enable you to tag one or two files and then perform an operation on all oth-

Whether you are looking for a file management utility or a friendlier interface than DOS, you should look into XTREE. Despite minor flaws, it is an elegantly simple program.

# A Viable Alternative to the DOS Prompt: XTREE

BY VINCENT PUGLIA

If finding a file on your hard
disk is beginning to resemble a
frustrating session with an adventure-game maze, you should
look into XTREE by Executive
Systems Inc. It won't improve
your scores or extend your game
character's life in any of the adventures, but it will make oper-

ating a PC a lot easier. Essentially a file- and directory-management utility, XTREE is a viable alternative to PC-DOS's stark and intimidating prompt. Unlike some systems software, this menu-driven utility does not force you to learn any new commands or syntax, nor does it require any exhaustive training periods. In fact, it may be the nontechnical

user's answer to PC-DOS's pernlexities.

Once booted, XTREE automatically divides the screen into three windows. The two windows on the left are used for displaying the directories and files. The number of subdirectories and files on the disk determines the size of the windows.

The upper-left window consists of a tree-like outline of the disk's directories. Each subdircetory is indented and graphically linked to its root, and a highlighted bar indicates the current directory. Hitting the cursor keys moves the bar from one directory to another. Hitting the Enter key moves the bar from the directory window to the program's lower-left window, which lists the chose off-

# XTREE

Executive Systems Inc. 15300 Venture Bivd., #305 Sherman Oaks, CA 91403 (818) 990-3457 List Price: 549.95 Requires: 192K RAM, one disk drive, PC-DOS 2.0.

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#### THE SHORT REPORT BY PHIL WISWELL

# Alternative Input Devices to Send Mice Scattering

The Footmouse

A lot of PC users say there's nothing like editing with a mouse. A mouse scampers your cursor through a spreadsheet, document, or program listing much faster than the keyboard, and it frees the numeric keypad for data entry. But the mouse introduces two disadvantages that put some people off. First, you need at least a square foot of clear desk space to run the mouse. Second, your mouse hand must move back and forth from the device to the keyboard, which makes you wish you had another hand. A viable alternative to keeping a clean desk and growing a third arm is presented by the Footmouse (Versatron Corp., Healdsburg, CA 95448; 707-433-8244; \$149).

This foot-operated cursor movement device is 4 inches square and I inch high and is angled for comfort like the power pedal of a sewing machine. Your foot rests on a circular pad. By giving a slight up, down, left, or right nudge to the pad, your cursor moves across the screen. A slight click accompanies the movement of the pad, your cursor moves across the screen. A slight click accompanies the movement of the pad, your cursor moves across the screen of the pad. Continuing to press the pad in one direction causes the cursor to move rapidly.

Learning to use the Footmouse is like learning to pat your head and rub your stomach simultaneously. It feels unnatural at first. However, you'll find that you begin to develop some coordination after 2 or 3 days of

constant use.

Installation is simple. You plug your keyboard into a small conversion box, plug the box into the keyboard port, turn on





the computer, and begin editing. There's no software to worry about nor do you have to install drivers or set DIP switches. (Incidentally, this setup lengthens the reach of your keyboard cord by about 18 inches.)

A mouse allows you to leave your keypad in NumLock status for entering numerical data, and so does the Footmouse. This function is one of the greatest benefits of either device, making spreadsheet entries a lot easier and faster. But I think the Footmouse is better suited and even faster for entering spreadsheet entries and faster. But I think the process of the property of the p

the keyboard saves time. In all fairness, the mouse offers a faster method of moving through large documents with a word processor, and its editing buttons are not available on the Footmouse. The mouse is also a much better eraphics too

The Footmouse works with a wide range of software types, and it's as compatible as anything you're currently using to control the cursor.

# Executive Cursor Control

Another alternative to the digital mouse is Executive Curror Control (Kraft Systems Company, Visita, CA 92083; (61)) 724-7146; 569 95; requires 64K RAM, DOS 2.x.1, a program that transfers control of the cursor to a joystick. It is a more familiar concept—and thus more easily learned—than the Foot-mouse, and the twin joystick buttons can be programmed for any keystroke, including Del, PRUP, End, and so forth.

Executive Cursor Control is compatible with programs that use direct BIOS read calls such as MultiMate, Lotus's 1-2-3, XyWrite, PC File, Professional Editor, and the Norton Utilities. A special file is provided to drive IBM's TopView. Unlike the Footmouse, however, it does not work with every program that makes use of the cursor keys, and you should be sure it works with your major applications before you buy it. The software can be purchased alone for \$39.95 if you already own a

Kraft joystick. It is not clear

patible with the software.

Though installation is not as is simple as with the Footmous this is straightforward and takes about 60 seconds. First, you type SETUP and identify the keys you want represented by the red and black joystick buttons. Next you load ECC, which remains memory resident until you reboot. Then you load doyour application.

Executive Cursor Control is

Executive Cursor control is similar to the Footmouse in actual use. A brief push of the jossisk moves the cursor one position up, down, left, or right, by bodding the sitek in one direction, the cursor moves rapidly. Like a moses, the joystick has control to the cursor moves republicate in the cursor moves and the cursor moves the cursor moves the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves are cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the cursor moves and the

My favorite feature of this product is the file of 1-2-3 joystick macros, which lets you call six menus to screen and activate their Lotus commandssuch as DUP COPY, @SUM,
COL ADD, INS ROW,
ERASE, and VIEW GRAPH—
with the joystick. If you need other functions and you know how to create Lotus macros, you can add your own to the
menus.

ECC solves the desk-space problem by taking up only 4 square inches. Because you don't have to move it over a surface, the joystick can be operat-

ed from an armchair.

Both the Footmouse and Executive Cursor Control share
several advantages over the traditional mouse, and both are
good products that perform as
claimed. However, after testing, the mouse remains a more
powerful, flexible editing tool
because of its extensive twobutton functions. The two devices reviewed here should be
considered as alternatives primarily by users who can't stand

mice.

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# WAVE MATE BRINGS MUSCLE TO YOUR ITH IT'S 80286 MOTH

BULLET-286 makes the XT perform with greater power and speed than the IBM PC/AT

It's the new BULLET-2B6 motherboard for the IBM PC/ XT marketplace. This advanced-technology product utilizes the Intel microprocessor 80286 while maintaining both hardware and software compatibility with

the IBM PC/XT. By simply replacing the existing XT board with our new BULLET-286, you get greater power and speed than the IBM PC-AT. Thus, existing PC/XT users can preserve their investment in hardware and software while moving a quantum leap be-yond PC-AT performance.

The BULLET-286 contains a 6 megahertz no wait state 80286 microprocessor in place of the XT's 4.77 MHz B0B8. There is an B02B7 math co-processor option, B IBM expansion slots, and enhanced ROM BIOS. The BULLET-286 is equipped with 256K bytes of



memory, expandable to 1 megabyte on-board.
The BULLET-286 is compatible with the IBM PC/XT
to a degree far beyond the IBM PC-XT product. Application programs and operating systems (PC-DOS, CP)M, UCSD Pascal, Pick, Oasis,
Unix-derivitives) available for the

XT, can run without incompatibilities on the BULLET-286 You can order now. The BUL-LET-2B6 is available with 256K RAM, with options to 1 full megabyte. Prices start at \$1,995 Quantity discounts available. OEM and dealer inquiries

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# New on the Market

# ATS Turnkey Software The Industrial Systems Group of

The industrial species Order of Auto Tell Services has released two hardware/software packages for maintenance management and spare-parts inventory control. These packages can be used separately or together to form a single, comprehensive maintenance and inventory system.

ATS Turnkey Software packages are expandable from an entry-level, single-user setup with one ATS-enhanced IBM PC-XT and printer to a large multipse configuration with multiple printers and up to 32 PC workstations. Auto Tell Services, an authorized IBM value-added dealer, is targeting the systems for use in in-

dustrial plants, hospitals, colleges, and other institutions. Llst Price: From \$20,000 Auto Tell Services Inc. 600 Clark Ave.

King of Prussia, PA 19406 (800) 523-5103 (800) 362-5538 in Pa. Circle **645** on Reader Service Card

The Wire Manager Modul

RS-232
Interconnections between RS232 data processing and RJ-11
phone lines have been made easier with a series of adapters from
Nevada Western. The Wire Mananeer Modular RS-232 adapters.

are available for four-, six-, or cight-wire systems, interfacing standard rwisted-pair telephone wiring to RS-232 serial lines. Adapters are available with either male or female connectors. List Price: \$12.60 to \$14.60 each, depending on number of

Nevada Western 930 W. Maude Ave. Sunnyvale, CA 94086 (408) 737-2600

(408) 737-2600 Circle 635 on Reader Service Card

Spectrum HR 2000

Small- to medium-size companies will find that their personnel records management and human

resource reporting needs can now be met with the Spectrum HR/2000 package from Spectrum Human Resources Systems Copp. Spectrum HR/2000 maintains a comprehensive database of information for each employee. In addition to current job and pay information, records also include educational background, prior work experience and history, and special skills and training.



Western

The user may elect to use all or part of the more than 400 fields of information available.

Other Spectrum HR/2000 features include a management reporting and control system with 60 preformatted reports, the ability to make on-line queries in

plain English, and a comprehensive security system that provides protection for sensitive data.

List Price: \$5,975 Requires: 512K RAM, 10-Mbyte hard disk, PC-DOS 2.0. Spectrum Human Resources Systems Corp.

1625 Broadway, #300 Deriver, CO 80202 (303) 534-8813

Circle 644 on Reader Service Card

#### AusDATA ENTRY

Ausdata/U.S.A. Ltd. has introduced a terminal emulation program that permits the IBM PC to replace older IBM 3741, 5280, or Olivetti 523 terminals. AusDATA ENTRY is designed to make data entry as easy as possible and features screen formatting routines, data validation at



New on the Market Submissions Guide

All submissions to New on the Market should follow these guidelines:

 Include the retail price and details of both hardware and software needed for an end-user to properly use your new product. This includes required amount of RAM, number and type of drives, operating systems supported, and peripheral equipment needed.

Releases should be typewritten double-spaced on one side of the puper. Copies of advertisements may be included, but in most instances we need more information than is typically included in an ad. Include telephone contacts for marketing and technical questions.

If available, include black & white glossy photos of the product, 4 × 5 inches or larger.

New on the Market does not review products; do not send sample or demo copies of software. All product announcements are run on a space-available basis, at the exclusive discretion of the editor. Please note that it is impossible to guarantee publication of a product announcement for any puricular issue.



the time of entry, and data verification by rekeying. Screen formats are defined in a high-level language that requires the user to have little programming knowledge. Up to eight screen formats can be linked together for a single application.

Once an application has been created with AusDATA ENTRY.

The operator can enter, correct, verify, duplicate, delete, or print records in batch files that can be stored on disk. When the operator makes changes within these files, the program automatically adjusts accumulated totals, batch totals, and checks digits.

List Price: \$895 Requires: 256K RAM, two disk drives, PC-DOS. AusdetalU.S.A. Ltd.

P.O. Box 291 Saratoga, CA 95071 (408) 241-4550 Telex: 494-4719

Circle 647 on Reader Service Card

# RACET Color Hard Copier

Users wishing color copies of CRT graphics images can now print them easily with RACET computes Ltd. 's Color Hard

Copier.
This printer offers significantly better color density and resolution than alternative dot matrix, ink jet, or laser jet technologies. In addition, he printer can connect directly to the RGB output of the user's system, climinating the need for special software drivers. List Prices: \$5.495
RACET computes, Ltd.
1855 W. Karol.

Orange, CA 92667 (714) 997-4950 Circle 630 on Reader Service Card KeepTrak

Sound Decisions is distributing the KepfTrok database management system originally developed by Soft-Ray Systems. KeepTrak offers many features found in more expensive DBMS software, including the ability to sort and search on any field, to specify up to three sort fields with optional totals and subteats of mumeric data, to merge, pdf, or computed fields, and to enter repeated data with a single keystroke.

List Price: \$79 Requires: 128K RAM, one disk drive, PC-DOS. Sound Decisions 19925 Stevens Creek Blvd. #184

Cupertino, CA 95014 (408) 973-7864

Circle 653 on Reader Service Card

# Tiger-32 Board

A XENIX-based, full 32-bit coprocessor board designed to provide the IBM PC-XT user with high-powered, multiuser, multitasking processing power. The board uses the IBM PC's 8088 microprocessor (or the AT's more advanced 80286 chip) as an I/O processor trunning DFE Electronic Data Systems's XENIX Interface Program (XIP) from PC-DOS. All internal portion PC-POS All internal portions PC-POS Al

The Tiger-32 Board incorporates an NS32032 32-bit microprocessor with a companion NS32082 memory management unit, 512K bytes of RAM, a 6-MHz clock (or a 10-MHz clock available as an option), and a complete two-user XENIX 3.0 operating system. The included

cessing is handled by the board's

own circuitry.

XIP software is designed to handle all standard IBM FC I/O devices while permitting XENIX to read and write PC-DOS files, issue BIOS and DOS interrupts, and transfer data between the board's memory and that of the PC-XT or PC AT. During periods when XENIX

content can be used to extend up to the G40K-byte limit of PC-DOS for system memory, or up to the 640K-byte limit of PC-DOS for system memory, or up to 2 megabytes for a RAMdisk. Available options for the Tiggray 2B board include a 10-MHz clock, an NS32081 Floating Point Unit, up to 2 megabytes of RAM, a 16-user version of XENIX, and the SVS FOR-

is not needed, the board's RAM

TRAN, Pascal, and COBOL languages. List Price: \$2,095; options, \$330-\$1,600 DFE Electronic Data Systems 1250 Oskmead Pkwy., #210 Surnyvele, CA 94086 (408) 730-2652

Telex: 023-172211

Circle 634 on Reader Service Card

#### Magic Removable Winchesters

MA Systems has announced two additions to its line of half-height, 54-inch removable cartridge drives. Called the Magic Removable Winchesters, the subsystems are available in 5-megabyte and 10-megabyte models that can be housed direct-

ly within the user's system unit.

Each subsystem includes the removable cartridge drive, a disk controller card, cables, and an optional power supply if needed.

Based on the SyQuest disk drive, the Masic Removable Winches.

optional power supply if needed. Based on the SyQuest disk drive, the Magic Removable Winchesters can be matched to fixed hard disks using a single disk controller card for both types of Winchester drives.

List Price: Available from the manufacturer MA Systems 2015 O'Toole Ave. San Jose, CA 95131

(408) 943-0596 Circle 833 on Reader Service Card

# Seltware Compendium This collection of 19 BASIC pro-

grams comprises games for children and adults. Distributed as user-supported software, Software Compendium from Aquarian Concepts can be freely cooied and shared by users.

Each game is designed for a different age group, starting with children as young as 3 years. Word games use vocabulary taken from school texts for the appropriate age levels. The programs interconnect via a master menu and contain all directions for play within the program.

Novice BASIC programmers can use the programs as study material to learn programming methods. Games include mazebuilding routines, space invasions, anaeram and math drills.



Magic Removable Winchesters, MA Systems

## **NEW ON THE MARKET**

and a two-dimensional version of Rubik's Cube. Requested Contribution: \$29.95

Requires: 64K RAM, one disk drive PC-DOS Aguarian Concepts P.O. Box 2418

Woonsocket, RI 02895 Circle 654 on Reader Service Card

# Electra Guard System 12

Computer Power Solutions's Electra Guard 12 power strip protects computer equipment from transient power surges and spikes, as well as RFI noise. It offers six guarded AC outlets controllable from a master power switch and is rated at a power capacity not to exceed 1,875 watts. List Price: \$59.95

Computer Power Solutions Inc. 8800 49th St. #203 Pinellas Park, FL 33565 (800) 237-6010 (813) 544-8801

Circle 640 on Reader Service Card Electra Guard System 12.



Label-MaKRs, Data Solution Systems

Label-MaKRs IBM PC users with an Epson or Okidata graphics printer can now print any of four different bar codes using one of Data Solution Systems's three Label-MaKR programs. The initial offerings in the software series include HIBC-MaKR, designed for

health industry suppliers; LOGMARS-MaKR, for govern-ment contractors; and Utility-MaKR, for printing bar codes according to user specifications.



Task Tracker This add-on package for Lotus's 1-2-3 allows the user to create a database of personal tasks-appointments, commitments, events, and so forth-in a familiar environment. The menu-driven system from RoMec is one of a series of programs designed to enhance 1-2-3

List Price: \$79 Requires: Lotus's 1-2-3. RoMec Inc. 1000 Tech Park Dr.

Billerica, MA 01821 (617) 667-8944 Circle 652 on Reader Service Card All three programs support the Codabar, Interleaved 2-of-5, UPC, and Code 39 bar codes. Each has provisions to simplify the selecting of label type, size, density, and number of copies during a print run. There is also a provision for saving label designs on disk

LOGMARS-MaKR prints unit or exterior labels according to the MIL-STD-129J and MIL-STD-1189A specifications. HIBC-MaKR can produce labels according to the HIBCC specification. Utility-MaKR features additional options of autoincremental label runs, data input from disk files, and up to ten lines of additional text in three sizes of characters.

List Price: Utility-MaKR, \$129; LOGMARS-MaKR and HIBC-MaKR. \$199 each Requires: 64K RAM, one disk drive, PC-DOS, graphics

nrinter **Data Solution Systems** 130 Crespo Ct. Santa Cruz. CA 95060 (40R) 458-993R

Circle 631 on Reader Service Card

## Just-In-Time

Micro-MRP has announced a new module for its multiuser manufacturing production system. MAX. The Production Manager. The new module, Just-In-Time, permits MAX users to plan and schedule parts inventories. labor resources, and work loads based upon data collected by the

system. List Price: \$4,000 Requires: MAX. The Production

Manager Micro-MRP Inc. 1065 F. Hillsdale Blvd.

Foster City, CA 94404 (415) 345-6000 Circle 650 on Reader Service Card

# Sola GS2X Power Monitor

An intermediate-size power line monitor with built-in thermal printer and LED-equipped front anel is being offered by the Sola Unit of General Signal. The Sola GS2X Power Monitor plugs into any standard AC outlet and provides a continuous analysis of the

quality of the line's power. The device features user-adiustable disturbance thresholds and detailed readouts of disturbance values. The built-in thermal printer produces a record of each disturbance as it occurs, including date, time, and value. It can be set to signal the first occurrence of a disturbance with an audible alarm. LED indicators for each type of power disturbance-power failure, high/low voltage, spike, voltage drop, line noise, or high/low frequency oscillations-reveal the types of problems detected

List Price: Under \$1,600 Sole Unit. General Signal 1717 Busse Rd Elk Grove Village, IL 60007

(312) 439-2800 (312) 228-1250

Circle 639 on Reader Service Card

# Modular Bridge

Users of the PICK PC-XT Operating System can now transfer data to and from PC-DOS easily with the Modular Bridge utility from Modular Software. The utility allows DOS files to be written onto PICK T-Dump

format disks.

List Price: \$100 Requires: 192K RAM, one disk drive, PC-DOS 2.x. Modular Software

P.O. Box 204 Union City, GA 30291 (404) 964-7171

Circle 643 on Reader Service Card



Sola GS2X Power Monitor, Sola Unit, General Signal

# **NEW ON THE MARKET**



# The TurboPuck

The TurboPuck is a point-and-select device that offers a viable alternative to digital mice or digitizing tablets. This device from the KA Design Group is connected to the user's system via a standard RS-232 serial connector. It can be instructed to operate as either a two- or three-dimensional cursor mover, with movement resolutions anywhere between 10 by 10 elements up to 16,384 by 16.384 elements. The Turbo-Puck can also be set by the user to communicate over its serial link at any rate between 300 and 19,200 bits per second.

19,200 bits per second.
The device may be handheld
and operated in any position.
Three tactile switchs are mounted
above the device's control as
a command key and a shift key
for the other two switches, providing a maximum of five software-configurable command
keys. An internal power supply
for the low-power CMOS circuity allows a single 5-voli power
source to produce the full bipolar
output required of an RS-322 deoutput required of an RS-322 de-

vice. List Price: \$159.95 KA Design Group 6300 Telegraph Ave. Oakland, CA 94609 (415) 654-6300

Circle 632 on Reader Service Card

#### Quickcite

This bibliography and general card sorter program offered by Chaucer Software allows the user to set up lists of variable-length records for the creation of bibliographical sections of documents written using any word processor. The bibliography format used by the Quickrite software follows that of The Chicago Manual of Six 10.

During sorting, Quick-rire can be instructed to ignore a word processor's formatting commands embedded in text. Entries may be sumbered or ensumbered cassily, and a "metacharacter' feature allows foreign language characters to have special meanings. Duplicate authors' names may be globally replaced or restored from embedded dashes. Features are definable from menus, and a built-in timer keeps track of performance.

track of performance.
List Price: \$22.50
Requires: 64K RAM, one disk
drive, PC-DOS.
Chaucer Software
P.O. Rox 2308

Princeton, NJ 08540

Circle 845 on Reader Service Card

#### HeinTM

Help Technologies has announced a menu-driven help system for PC-DOS. The HelpDOS program provides on-screen reference data and examples of DOS syntax usage, special key-

# HelpDOS The Help System for PC-DOS 4 MS-DOS

for pospersus for DOS & MS-DOS

Reference belormetic below Directors

Reference belormetic below of Extraordish

Help Technologies

board keys, and batch file commands.

An included technical dictio-

nary explains many of the oftenconfusing terms by a pose of the DOS. A special "Hints" feature allows the user to select the proper DOS facility to accomplish a task. Selecting Print, for instance, provides a menu of the ways in which PC-DOS can access and affect a printer.

List Price: \$49.95 Requires: 128K RAM, one disk drive, PC-DOS 2.x.

Help Technologies P.O. Box 50834 Palo Alto, CA 94303 (415) 856-3431

Circle 642 on Reader Service Card



maon Computer Monitors, Thomson Consumer Products Corp

#### MACROMENU_EXE

This low-cost utility combines the capability to produce DOS menu screens with the ability to program up to 20 function key macros. The combination of feattures gives the user the necessity tools to establish a customized working environment within PC-DOS.

MACROMENU.EXE uses a single editing screen for user-created menu prompts up to 62 characters long and to program function key macros. Macros can be set up with any valid DOS command sequence or program call up to 24 alphanumeric characters

long. The user-supplied menu and macro-key sequences are then compiled by the program into an assembly language. COM file that forms pop-up menus on-screen. This approach is especially useful in systems with tight memory requirements, as the resulting menu and macro facility created by the user occupies only 2K bytes of RAM. Exhibits of RAM.

List Price: \$25 Requires: 128K RAM, one disk drive, PC-DOS 2.x. Genesee Computer Products 4967 Booher Hill Rd. Genesso, NY 14454

(716) 243-0701 Circle 837 on Reader Service Card

(716) 346-3014

Thomson Computer Monitors

s Thomson Consumer Products
Corp, has unveiled a new line of
monitors that comprises 1 4 models for professional and home
computer use. Eight models—6
color and 2 monochrome—are
intended for business users, and
offer such features as nonglare
tinted screens, built-in speakers,
a 25- line by 80-column displays,
an attached data cable, and

Five of the six models designed for private consumer use are color monitors, with features that include a 14-inch tinted screen, built-in speaker, and an optional tilt-and-swivel pedestal. The monochrome monitor offers high resolution in either amber or

composite video and RGB in-

nigh resolution in citaler amoer of green phosphor imaging. List Price: \$139-\$449 Thomson Consumer Products

Corp. 330 Washington St., #509 Marina del Rey, CA 90292 (213) 821-2995

Circle 629 on Reader Service Card

# Invisible Optimizer

Stellation Two has announced a program that effectively increases the processing speed of the IBM PC. Using a mainframe technique known as disk caching

## NEW ON THE MARKET

ble Optimizer reduces the amount of time needed to retrieve data from either hard or floppy disks. Any amount of available RAM in the user's system can be set up as the caching area.

List Price: Trial version, \$25: standard version, \$95 Requires: 128K RAM, one disk drive, PC-DOS 2.x.

Stellation Two inc. 26 W. Mission St., #3 P.O. Box 2342 Sante Berbara, CA 93120 (805) 569-3132 Telex: 65-8439

Circle 636 on Reader Service Card

laminate surface that prevents static electrical charges from affecting the user's system. List Price: \$125

Charles Leonard Inc. 111 Great Neck Rd. Great Neck, NY 11021 (516) 829-4460

Circle 638 on Reader Service Card

# Fasy-K

Users of the Knowledgeman database management system from Micro Data Base Systems will find Easy-K a simple means of manipulating data with a mini-



Rota-Titt

The Rota-Tilt monitor turntable enables the user to tilt a monitor plus or minus 12 degrees and swivel it in a complete circle. An adjustable friction wheel can be set to provide rotational drag or to freeze the monitor in one posi-

The unit features a separate shelf below the monitor suitable for storing a keyboard. The pedmum of programming expertise. Easy-K's menu system allows the user to select statistical, print control reporting or environment variables, as well as to browse, edit, delete, and undelete records.

An included menu-driven renort writer function formats sophisticated reports. Easy-K supports the use of color displays as

FINALIST FINALIST

Finalist, Infinite Information Systems Inc.

dard data entry screens List Price: \$120 Requires: 256K RAM, one disk drive PC-DOS 2 v Cactus Computers inc 60 Westminster Rd Great Neck, NY 11020 (718) 981-5076

Circle 649 on Reader Service Card

# Finalist

Infinite Information Systems has released a sophisticated list management program written completely in assembly language. In addition to features common to list management software. Finalist allows the user to sort data through up to 10 levels, redefine existing data files, and transport data to and from other software. rates controls for color and report creation, and features a wide range of conditional and relational operators for data manipula-

List Price: \$149.95 Requires: 192K RAM (256K RAM for PC-DOS 3.0), one disk

infinite informatio

#### Systems inc. P.O. Box 285

Rinir NF 68008 (800) 228,0303

(402) 426-5224 Circle 651 on Reader Service Card

#### KevMailer 2.0

SoftKey's KeyMailer 2.0 adds mail list management, merging, and report formatting functions to such word processing systems as WordStar, MultiMate, Word Perfect, and SuperWriter. This permits the user of these programs to create personalized letters and documents with data taken directly from KeyMailer's data files

Capable also of being used as a standalone list manager without a word processor, the program allows sorts and searches in a number of ways, including the use of wildcards, either/or, and inequality operands List Price: \$149

Requires: 128K RAM, one disk drive. PC-DOS. SoftKey Software

Products inc. 18480 Decatur Rd Monte Sereno, CA 95030 (408) 395-1974

Circle 648 on Reader Service Card



# We've Heard Rumors That The Guys At HP Are Experimenting With A Way To Make Their LaserJet As Smart As Our SmartWriter.



You can't blame them. There's a chance their customers will think they've gotten the most intelligent, most versatile desk-top-size, nonimpact printer on the

When, in fact, they may not have heard about ours. The remarkable OMS® SmartWriter™

Whoops! This could lead to some very embarrassing questions, such as:

"Will your LaserJet Printer support OUME.® Diablo.® Epson® and ANSI X3.64 escape sequences? The SmartWriter will.

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### EDITED BY CHARLES PETZOLD



# **PC** Tutor

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Who's Calling Whom?

Q. I'm confused about the answerforiginate conventions of full-duplex modern communications. According to everything I've read, answerforiginate refres simply to the selection of one of the two pairs of frequencies used during full-duplex communications to keep the binary signals of each modern separate from each other. Ihas nothing to do with which modern actu-

ally originated or answered the call. I recently purchased a Qubic 1200baud external modern. Unlike other modems, it has no separate answer/originate switch. Instead, switch 5 on my modem switches between auto-answer and answer modes. I don't want to set the modem for auto-answer, since I don't have a dedicated data line and I don't want people who call on the phone to get a modem's screech if I'm not home. But can I initiate a call to another micro while I am in the answer mode? According to everything I've read. the answer would seem to be yes, but according to Oubie Technical Support the answer is, "That's the most ridiculous thing I've ever heard." Can you clarify what I can and can't do?

James C. Cummiskey Honolulu, Hawaii

A. The Qubie is a Hayes-compatible modem, so these issues ore olso of interest to people who have Hayes modems or other compatibles.

Yes, you can originate to coll in answer mode. This is o feature specifically implemented in the Hayes 1200 modem and is referred to in the Hayes manual or reverse mode. It is generally used to coll up on originate-only modem. In reverse mode, the modem dito the number, emits o corrier using the answer frequency, and connects to o modem that onswers the call with the originate frequency. However, what you can do with your

modem is very closely tied to the capabilities of your communications softwore. Communications softwore written specificully for the Hayes (for instonce, Hayes' to Smartcom II offen forces you to the originate frequencies for placing to audinat the convert frequencies when and the source frequencies when and the source frequencies when and the susering o call. Crosstalk XVI and the suser-singported PCT-ALI III will allow serving the the modem for reverse mode when placing to coll by changing the dialing perils.

If you ore programming your own communications software (and if so, you might want to get the BASIC source listing offe-TALK to study some techniques), you can do his whatever way you want. For really low-level modem experimentation, you can even use the COMM.BAS program

supplied by PC-DOS.

Communications software sends command sequences to the modern to control it. Using PC-TALK or COMM BAS, you can issue these command sequences yourself just by typing them ot the keyboard. For Hays-compatible moderns, the commond sequences begin with AT, which stands for ottention. I'll use some command sequence examples below.

For micro-to-micro communications, probably the easiest method is to switch from a voice call in progress to a modem call. The two of you would decide upon the bend rate, parity, stop bits, and who will be "answer" and who will be "ariseinate." The originator enters the command sequence ATD and the answerer enters ATA. The answerer's modelm will entit o corrier signal, the originator's modem would onswer with its own, and you're

linked. Now you con hang up the phones ond start typing. For unattended answering, you need to send o control sequence to your modem to answer o call after a certoin number of rings. This is done with register SO. The command ATSO=3 will program the mo-

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### PC TUTOR

originase mode.

dem to answer a call after three rings and emit a carrier signal in answer mode. Someone calling you would program his or her modem with the control sequence ATD followed by your phone number. That calling modem would wait for an answer mode carrier signal and then respond in

Smartcom II and Crosstalk XVI can be set up for unattended answer mode and allow the caller to transfer files. Note that this need not permanently tie up your phone line. The modem does not answer the phone until it has rung three times (or whatever the setting of SO is). If you grab the phone before then, the modem will not

answer the call at all. (You may want to look over Winn Rosch's PC News column in PC Magazinc. Volume 4 Number 17 on some problems with this method, mainly the fact that people who call your number and hear the tone know you have a modem and may try to break into your system, if not your

home.) Now for reverse mode. Here, the caller enters ATDR (instead of ATD) followed by the phone number. The R specifies reverse mode. The modem will dial the number and then emit an answer carrier frequency. Simple enough. However, on the other end, the software must detect the ringing signal, then answer the phone in originate mode. This is somewhat more difficult with a Hayes-compatible modem, because the communications software rather than the modem must detect the ringing signal, pick up the phone (electronically speaking). and so into originate mode.

Because programs like Smartcom and Crosstalk handle normal answer/originate mode and have systems for unattended answering, I would recommend sticking with them unless you're doing your own programming.

To clear up a few other points you raised: Hayes-compatible modems do not have physical answer/originate switches because the mode may be controlled entirely with software control sequences. Switch 5 on the modern does not actually switch the modem into auto-answer mode. Instead, it enables or disables auto-answer. However, since the switch setting may be overriden by register SO anyway, it's rather useless. The IBM PC board-ver-

sion of the Haves 1200 modem does not include the switch.

FAT Clusters

O. I just installed a 20-Meg Seagate 225 half-height hard disk drive, and after get-

ting it up and running, I found my segment size is 8,192. Why does the hard disk use 8,192 instead of 1,024, or do I have a problem with the disk controller? At the rate I am using up chunks of memory, I have an effective 10-Meg drive instead of a 20-Meg drive.

Gil Seiler Santa Rosa, California

A. The trouble lies in DOS and in a certain lack of vision among its early designers. The problem has been at least partly rectified in DOS 3.0, but it should have been fixed with DOS 2.0.

In DOS lingo, the cluster size on your hard disk is 8,192 bytes. Sectors on the diskette allocated for file storage are grouped in clusters. Each sector contains

512 bytes, and a cluster may equal 1, 2, 4, 8, 16, or even more sectors, depending upon the size of the disk. Each file on the disk is allocated one or more clusters, even if the file is smaller than one cluster. Your 20-Meg hard disk uses 16 sectors per cluster. So, if you create a 1-byte file, your available disk space decreases by a full 8.192 bytes

If this sounds like a waste, it is-particularly if you have lots of small files. But it's an unfortunate result of the manner in which DOS stores files on the disk.

Near the beginning of every formatted disk is a File Allocation Table (FAT). This table is used in conjunction with the directory to map a file on the disk. As you may know, files are not stored in consecutive sectors on the disk, so the disk must consain information to allow DOS to retrieve the file from many different places on the disk. The directory entry for each file indicates the first cluster in the file. When this first cluster number is "looked up" in the FAT, the FAT points to the second cluster number in the file, and so forth. (This is documented in the IBM DOS Technical Reference manuals.)

Since the FAT must have an entry for every cluster on the disk, the size of the FAT must be larger for smaller cluster

### PC TUTOR

sizes. The problem is that FAT entries under DOS1: x and 2. x are only 12 his long. The who his is only enough to express on unber between 0 and 4,055. Since some cluster numbers are reserved, the total number of clusters on a hard disk is 4.0°B. I you divide that into 2,000,000 that of the proximate proximate size of your hard disk), you'll find that the clusters tize has to be greater than 5,000 bytes. The next highest power of 2 to 8,192, and there you are.

Under DOS 3.0 and above, the FAT entries may be either 12 bits or 16 bits long.

If you create a 1-byte file, the available disk space decreases by 8,192 bytes. If this sounds like a waste, it is.

For 16-bit FAT entries, you can have a maximum of 65.518 clusters on your disk. For your 20-Meg hard disk, the cluster size could be as small as 512 bytes. (In reality, this would not be done, because disk access time would be slower since files

would be more fragmented.)
Under PC-DOS 3.x, the FDISK program determines at the time you create the
DOS partition whether your hand disk will
use 12-bit or 16-bit FATs. Very simply, it
checks whether the total amount of 512bit sectors is less than 0.2740 or not. If
the DOS partition is greater than or equal
to 20,740 sectors, a 16-bit FAT is designated in the boot record partition table of
the hard disk.

the hard aiss.

A standard PC-XT 10-Meg hard disk partitioned entirely for DOS contains 20,739 sectors (305 cylinders times 4 heads times 17 sectors minus 1 sector for the partition boot record), so FDISK 3.x gives it a 12-bit FAT. Any larger disk would eet al. 6-bit FAT.

The FAT and the directory are not actually set up on the hard sids until you sus the FORMAT command. The FORMAT command also sets up the DOS boar record in the first sector of the DOS partition of the Host sector of the DOS partition of the BIOS Parameter Block, which gives DOS as boot time information about the disk. In-cluding the number of sectors per cluster. When the standard 20-Mee FO AT hard

disk is formatted under DOS 3.x, it gets a cluster size of 2.048 bytes (4 sectors).

How can DOS 3.x solve your problem and similar problems other readers may have? You're in luck if you have an "IBMcompatible". I mean that you don't receid a compatible". I mean that you don't receid a compatible". I mean that you don't receid a like you can obtain PC-DOS 30 of 3.1, bock up your hand disk entirely (do it wise), received your DOS partition with FDISK 3.x, and referrent your hard disk would be you have the your book partition with FDISK 3.x, and referrent your hard disk would have a cluster zie of 2.0 80 buse.

Give this a lot of thought before you do it, however. Once you FDISK and FOR-MAT your hard disk for 16-bit FAT entries, you cannot boot up your system with DOS 2.x and expect to read the hard disk. DOS 2.x will not even recognize the hard disk as having a DOS partition, and DOS 2.x cannot deal with 16-bit FAT entries.

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I cannot imagine why PC-DOS did not use 16-bit FAT entires from the very begin ning. For diskents, the fatter FAT would have taken up at most only another 18 by et of space, and on the PC-XT 10-megabyte hard disk, only another 3 K. From a programming perspective, working with 12bit FAT entires is a real missance; 16-bit FATs are simple. In erwopsec, the 12-bit FAT are simple. In erwopsec, the 12-bit FAT simply looks like a major blunder of DOS design.

The PC Tutor solves practical problems and explains points of general interest. To see your question answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016. Sorry, individual replies are not possible.



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# Honing Your Programming Skills

One of the catches of programming is that there's always more to learn. Here's a look at three books that list some neat tricks and help improve your programming.

he BASIC listings for nine readyto-run programs contained in . Cookbook of Creative Programs for the IBM PC and PCir really aren't much for the money. These programs are supposed to cover three areas according to the book's subtitle, Projects for Music, Animation, and Telecommunications. I was really looking forward to the programs for modems because you don't run across them very often in a book like this.

Imagine my disappointment to find the section on telecommunications was nothing more than a brief discussion of things like signal rates, stop bits, and electronic bulletin boards-not a single line of code for telecommunicating. The programs in this book let you draw graphics, animate them, and create music-the usual offerings.

The listings for each of the nine programs are contained in the back of the book in their entirety, but program modules and subroutines are spread throughout and can be used alone or with other programs. In all, the book contains a library of about 100 subroutines or modules that would be useful in many other programs.

Cookbook of Creative Programs for the IBM PC and PCir: Projects for Music, Animation, and Tele-

Robert Rinder New American Library

1633 Broadway New York NY 10019 (212) 397-8000 Copyright: 1985

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Each listing has its own chapter and leads the reader through the building of the back-of-the-book program one module at a time. The text does not belabor any point nor discuss every aspect of the program in detail, but it does a thorough job of ex-



plaining what each line of code does.

The programs are more entertaining than useful, and there is great incentive to finish each project because you don't have to wait until you've typed in all the code to see something happen. You build the programs in modules and connect them to the previous work, testing each one as you go. This is also helpful for keeping typing mistakes to a minimum.

The first program is designed to let you draw on your screen with any of the PC's graphics characters in color, save a drawing to disk, and incorporate it within another program. Some might find this trick

useful. I found it fun. And it was a very nice surprise to discover that the next program, Lightshow, was based on 50 percent of the code from the drawing program. I just eliminated some lines, typed in a few more, and the new program was ready. The author's intention here was to demonstrate the benefits of modular program design.

Each program in the book was an eniovable and worthwhile learning experience, with the exception of a few gambling and probability programs thrown in for who knows what reason. This is a book best suited for the beginning or intermediate programmer who wants to learn not only about graphics and sound on the PC but also wants to develop a solid modular development style.

Again, there are no telecommunications projects in this book, and the cover is misleading at best, dishonest at worst. Cookbooks generally have a few more recipes than what you find here as well. Still, the programs are well constructed and interesting enough to make the book a good place to start learning BASIC.

### Perfecting a Craft

According to Craig Jensen, author of The Craft of Computer Programming: How to Write Quality Software in Any Language, there is no longer a shortage of computer programmers, only a shortage of good ones. The overall point of Jensen's book is that writing a computer program is not a magical act. Rather, it is a craft, like custom cabinetry or model building. The pieces of a program are jumbled together in a box labeled "programming language," and it is the programmer's job to take them out, assemble them in the correct order using the proper glue, and finetune the results to perfection.

His message to programmers and would-be programmers is to consider themselves craftsmen, not artists. Success, he believes, lies in knowing the medium inside and our, following pulse thoroughly, and creating a library of stock tools to be used over and over again. Midnight inspirations are not part of the craticals

### FACT FILE

The Craft of Computer Programming: How to Write Quality Software in Any Language Crag Jensen

Warner Books Inc. 666 Fifth Ave. New York, NY 10103 (212) 484-2900

Copyright: 1985 Cover Price: \$12.50 ISBN: 0-0446-38147-0 The Craft of Computer Programming is a theoretical work, providing less than a dozen listings of either programs or routines. In fact, you won't see a line of code in the first hundred pages. This is a book you are supposed to sit down and read from cover to cover; a refreshing ap-

proach, though lacking interactivity.

The Craft of Computer Programming concerns itself with writing well-documented, easily maintained programs on any computer in any language. The book contains no BASIC "is not a good starting place if you want to understand computer programming." In occumented that BASIC "is not a good starting place if you want to understand computer programming." In recommended first step, He would rather you begin closer to the heart of the machine by learning how instructions, data, memory, registers, and so forth combine

to move and manipulate information.

### Artful Engineering

The author doesn't want to teach you assembly, BASIC, or any other language, but to explain the principles of the CPU and peripheral devices and teach you good programming habits that apply to all languages. His intention is to convince you that programming is not an art form, but an eneincerine discipline.

The Craft of Computer Programming is an important book and one that will benefit beginner and advanced programmers alike. It does not waste any time or space on handing over listings that will impress your friends. Jensen has left that to the authors of the other books in this review.

### Information Manipulation

We all know that imitation is the sincerest form of flattery; it is also the most common method of learning. To become a dentist, you must copy and practice the techniques of other dentists. To become a



quarterback, you must copy and practice the techniques of other quarterbacks. So, too, must you imitate other programmers to become one

In this spirit, Henry Simpson has written Serious Programming for the IBM PC/XT/AT, which includes about 40 programs and subroutines. They are all in BA-SIC, none even slightly frivolous or entertaining. Like Jensen, Simpson argues the virtues of modular programming and topdown design, though in far fewer pages.

Serious Programming for the IBM PC/XT/AT concerns such topics as deactivating "dangerous" key combinations, data-entry verification, error handling, collecting keystrokes, generating menus, screen design, and reading and writing sequential and random access files. Each topic comes with its fair share of type-it-inand-try-it-out BASIC examples. The author admits that there are hundreds of ways to write each module but adds that learning one method well is better than learning a dozen methods incompletely. "Less is

more," Simpson writes. The programs, subroutines, and little pieces of code found throughout the book are all meant to be tried out by the reader. and the accompanying explanations of their line-by-line workings is excellent. What's more, the listings are logically connected to form a progression through information display, user input, verification, error testing, file handling, and so on,

The thrust of the book is how to manipulate information. Graphics and sound are barely touched upon because those subjects are of less importance to the types of program structure and design philosophy that Simpson hopes to impart.

The author has written the text and exemplary code for programmers, or at least for those who already have some programming skills. He does not waste time ex-

Serious Programming for the IBM PC/XT/AT

Henry Simpson TAB Books Inc. Blue Ridge Summit, PA 17214

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ISBN: 0-8306-0921-0 CIRCLE 663 ON READER SERVICE CARD

PC MAGAZINE . NOVEMBER 12, 1985

plaining things like the FOR/NEXT loop, | so beginners beware: This book is probably above your scope. However, Serious

teractive book, The Craft of Computer Programming.

Programming for the IBM PC/XT/AT | Phil Wiswell is a frequent contributor to makes a good companion to the far-less-in- PC Magazine.

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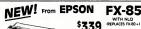
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Productivity is and always has been one of the hottest topics in the business world. Because all managers naturally want to squeeze maximum efficiency out of every available human and nonhuman resource, every product on the market today advertises itself as a "productivity enhancement tool," Where can you get the real facts? In PC Magazine, of course.

The main focus of PC Magazine is business efficiency. Every article is geared toward helping you get the most out of what is undeniably the greatest office productivity tool of this century: the IBM PC. In the next issue, a battery of writers and editors select and review 16 real-life hardware and software products that represent solutions to some of the most common productivity bottlenecks around.

### Sheet Feeders

If you own a printer, chances are you're using a standard pin or tractor-feed mechanism to get paper through it. If, however, you want to print out on envelopes or letterhead paper, you should explore the possibility of adding a cut sheet feeder to your printer. These once-costly add-ons are now surprisingly affordable and may pay for themselves in the time you save not having to remove the perforated edges from documents printed on fanfold paper.



### MacCharlie

Amidst the growing debate over whether the IBM PC or the Apple Macintosh is the better business computer. Dayna Communication boldly suggests, "Why not have both?" The company's new Macintosh add-on, MacCharlie, runs MS-DOS programs and, in general, functions just like a PC. Overall, MacCharlie combines some of the best features of the Mac and the PC and even allows you to transfer files between the two machines.

### Zero-Slot LANs

As a part of PC Magazine's continuing effort to find the best ways to get PCs talking to one another, Frank J. Derfler, Jr., evaluates three low-cost local area network (LAN) solutions. Priced at \$110 to \$200 per machine, these LANs not only save money but have only one simple requirement; the standard RS-232C serial port, which you probably already have on your PC.

### Diagramming Tools for Business

Granhics are not only for show-why use a fancy presentation when a simple drawing will do? PC Magazine's Cheryl Goldberg, Stephanie Stallings, Charles Petzold, and Barbara Krasnoff take a look at four packages that perform those basic graphics chores that are essential to the day-to-day operation of any business, like schematics, floor plans, Gantt charts, and other simple diagrams.

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